

The image shows the front cover of a book titled "GRAPHIC SCIENCE". The title is printed in a large, bold, sans-serif font at the top. Below the title is a central rectangular illustration with an orange background. Inside this rectangle, two white dice nets are shown. Each net is a cross-shaped arrangement of six squares, with black dots representing pips. The top net is oriented with its top face showing 1 pip, and the bottom net is oriented with its top face showing 2 pips. The entire cover is framed by a border consisting of the numbers "123456" repeated in a grid pattern. At the bottom of the cover, there is a library stamp from the "UNIV OF ILLINOIS" dated "FEBRUARY 1961", and a small, light-colored rectangular label with text that appears to be a library or archival marking.



The image shows the front cover of a book titled "GRAPHIC SCIENCE". The title is printed in a large, bold, sans-serif font at the top. Below the title is a central rectangular illustration with an orange background. Inside this rectangle, two white dice nets are shown. Each net is a cross-shaped arrangement of six squares, with black dots representing pips. The top net is oriented with its top face showing 1 pip, and the bottom net is oriented with its top face showing 2 pips. The entire cover is framed by a repeating border of the numbers "123456" in a blue, sans-serif font. At the bottom of the cover, there is a library stamp from the "UNIV OF ILLINOIS" dated "FEBRUARY 1961". The stamp is oriented upside down and includes the address "207B TRANSPORTATION BLDG URBANA, ILL" and the name "ATT GRACE WILSON-ASSST".

The image shows the front cover of a book titled "GRAPHIC SCIENCE". The title is printed in a large, bold, sans-serif font at the top. Below the title is a central rectangular illustration with an orange background. Inside this rectangle, two white dice nets are shown. Each net is a cross-shaped arrangement of six squares, with black dots representing pips on the faces. The dice nets are oriented diagonally. The entire central illustration is surrounded by a border consisting of the numbers "123456" repeated in a grid pattern. At the bottom of the cover, there is a library stamp from the University of Illinois, dated February 1961. The stamp includes the text "UNIV OF ILLINOIS", "207B TRANSPORTATION BLDG", "URBANA, ILL", "ATT GRACE WILSON-ASST", and "CD-V3-2 PROF".

The image shows the front cover of a book titled "GRAPHIC SCIENCE". The title is printed in a large, bold, sans-serif font at the top. Below the title is a central rectangular illustration with an orange background. Inside this rectangle, two white dice nets are shown. Each net is a cross-shaped arrangement of six squares, with black dots representing pips on the faces. The dice nets are oriented diagonally. The entire central illustration is surrounded by a border consisting of the numbers "123456" repeated in a grid pattern. At the bottom of the cover, there is a library stamp from the University of Illinois, dated February 1961. The stamp includes the text "UNIV OF ILLINOIS", "207B TRANSPORTATION BLDG", "URBANA, ILL", "ATT GRACE WILSON-ASST", and "CD-V3-2 PROF".



**PERFECT
FOR
EVERY
PROJECT**

CHOOSE FROM THE MOST COMPLETE LINE OF DRAFTING PENCILS

MICROTOMIC DRAWING PENCILS by Eberhard Faber are the choice of professionals. Produced in 18 uniform lead degrees...and chisel points in 6 degrees. Durable, precision-made MICROTOMIC lead holders with or without Eberhard Faber's new "degree window" are available too—priced from \$1.00. For special jobs on coated drafting films, Eberhard Faber offers new MICROLAR pencils with plastic lead in 5 popular degrees. MICROTOMIC pencils are PERFECT FOR EVERY PROJECT.

Like all Eberhard Faber products, MICROTOMIC drafting pencils are guaranteed to meet the highest standards of manufacture and to perform efficiently under normal usage.

Ask your nearest supplier for MICROTOMIC drawing pencils by EBERHARD FABER—your one source of supply for all writing needs.



SINCE 1849

EBERHARD FABER

puts its Quality in writing

Tm, Reg. U.S. Pat Off and Other Countries

Wilkes-Barre, Pennsylvania-New York-Toronto, Canada

GRAPHIC SCIENCE

THIS ISSUE: 11,700 COPIES

FEBRUARY 1961

VOLUME 3 NUMBER 2

The Magazine of engineering drawing management, covering drafting, reproduction and microfilming, technical illustration, drawing standards and drawing filing in all industries.

ARTICLES

- 12 DO YOU WANT A PROMOTION? by G. H. Taylor
A chief draftsman dispels some popular misconceptions as to why some draftsmen advance, while others stagnate
- 13 SIGNIFICANT DRAWING NUMBERS, by S. P. Waddill
A description of one type of sequence predicated upon the breakdown of a weapons system into its major segments
- 16 GRAPHICAL COMMUNICATION PROBLEMS
Drafting for numerical control machining, and simplified drafting have posed difficulties requiring exploration and solution
- 20 THE CASE FOR TECHNICAL ILLUSTRATION, by J. R. Lindley
Pictorial representation saves both writer's and reader's time when properly combined with the manuscript
- 23 HEAT DEVELOPING VISUALS
New film for overhead projection develops permanently in four seconds; various colors are available

Publisher

CHARLES E. RHINE

Editor

PAUL YAKE

Assistant Editor

ELEANOR W. THOMPSON

Associate Editors

JAY H. BERGEN

WILLIAM S. HUTCHINSON

WILFRED J. THOMPSON

IRWIN WLADAVER

Business Manager


DAVID Z. ORLOW

DEPARTMENTS

- | | | | |
|---|------------------------------------|----|-----------------|
| 4 | LETTERS | 10 | NOTES & COMMENT |
| 6 | MILITARY ENGINEERING DOCUMENTATION | 22 | NEW PRODUCTS |
| 8 | GRAPHIC PERSPECTIVE | 26 | NEW LITERATURE |

GRAPHIC SCIENCE is published monthly by Kinelow Publishing Company, Inc., Wilton Center, Wilton, Connecticut. (POrter 2-5564). Charles E. Rhine, president; Paul Yake, vice president; David Z. Orlow, secretary-treasurer. GRAPHIC SCIENCE is published (printed) at 116 Main St.,

Norwalk, Conn. Address changes, undeliverable copies, and orders for subscriptions should be sent to Editorial Offices, Wilton Center, Wilton, Connecticut. Postmaster: Form 3579 requested. Subscription rates: \$8.00 per year in the United States; \$9.00 per year to Canada; \$10.00 per

year to other countries. Single copies: \$1.00. ©Kinelow Publishing Company, Inc., 1961. Accepted as controlled circulation publication at Norwalk Conn. Member Business Publications Audit of Circulation, 

Letters

Undimensioned Drawings

Sirs:

We find that our company, as so many others, are in need of additional copies of your magazine. Could you send us two additional questionnaires?

We have been receiving GRAPHIC SCIENCE since its first issue. The magazine contains many interesting articles on the state of the art used in various companies throughout the country.

The magazine also acts as a liaison and we would like to request your help in obtaining any available data on undimensioned drawings and lofting techniques. We are in the process of educating our draftsmen and engineers in the preparation and use of this type drawing. Any information you may send will be appreciated.

W. R. Goss

Supervisor

General Electric Company
Combustion & Exhaust Drafting
General Electric Company
Cincinnati 15, Ohio

Questionnaire

Sirs:

Would you please send three (3) subscription questionnaires for your magazine GRAPHIC SCIENCE to my attention.

I am sure that by circulating this fine publication through our design and drafting departments, we will be able to increase interest and benefit greatly by your articles.

SCHYLER T. WALLACE

Mechanical Engineer
Transonic, Inc.
808 Sixteenth Street—Box 59
Bakersfield, California

Sirs:

The past several months Alaska Airlines Drafting Department has reluctantly loaned me your superb magazine, GRAPHIC SCIENCE. I have found

this to be a wonderful source of information for my personal use and the students use it to do reference work on present industrial procedures. There is no material available on the market today that keeps us abreast of the times the way GRAPHIC SCIENCE does.

Pupils in my classes proceed according to individual abilities and it is possible for them to advance from simple mechanical drawing to architectural and engineering drawing within a full three year period.

It is hoped that I am eligible for a complimentary subscription, and that you will send me information on the acquisition of back issues.

J. LOWELL JONES

Drafting Instructor
Bellvue Senior High School
Bellvue, Washington

Sirs:

We have been receiving GRAPHIC SCIENCE since January of this year. To be certain our draftsmen all see it, we have prepared two routing slips; the second to be attached after the magazine has returned from the first routing. This has presented a problem. It never returns. Consequently, the men on the second list miss it, and the Library has no files.

Will you please furnish back issues for Library files? We would appreciate all back issues from this year, and whatever you may be able to send from Vol. I.

Our draftsmen and some of our engineers have found GRAPHIC SCIENCE very interesting and helpful. It has proved to be just too popular.

D. D. CLARK

Bucyrus-Erie Company
South Milwaukee
Wisconsin

Microfilm, 105 mm.

Sirs:

I can't really fill out your card

although I'm vitally interested in the results of your questionnaire (on microfilming). I assume that you will publish the results.

Our company does no drafting. We are in virtually all phases of reproduction work. In particular we have a 105 mm. installation. This 105 mm. size is standard for U.S. Army Engineers and Bureau of Yards & Docks of the Navy. It is standard (?) for the G.S.A.

Quality-wise 105 mm. is superior to 16 mm., 35 mm. or 70 mm. for reproduction of engineering drawings. At least partial proof of this statement is that two of my competitors who use 35 mm. send their tough jobs to us to turn out via 105 mm.

We find that the primary use of 105 mm. is to make a reproducible of some sort. This can be any scale or on any photographic reproducible material. The fact that we use 105 mm. is of little interest in 90% of the cases. It is only the finished reproducible that they are interested in.

Here are some of the uses our customers put our 105 mm. microfilm to: duplicate tracings same size (quite often making use of the paste-up method on the original that we photograph), half-size tracings (to print bid sets), scale changes, restoration work (tracings too old and cracked to make readable prints), tracings from hard-copy work, combining portions of drawings into one drawing, making 105 mm. negatives in order to throw "dead tracings" away and enlarge drawings for wall displays.

Perhaps this note is not responsive to your card, but I did want to show interest even though I couldn't fill out the card.

FRANK B. TALMADGE

Partner
Superior Blue Print Co.
1922 4th Avenue, Seattle 1, Wash.

Editor's Note: Annotated results of the GRAPHIC SCIENCE survey questionnaire on microfilming, which was distributed last fall, will appear in the special March issue on Reproduction.

(Letters to the editor should be addressed to GRAPHIC SCIENCE, Wilton Center, Wilton, Connecticut. Names will be withheld upon request but all must be signed.)

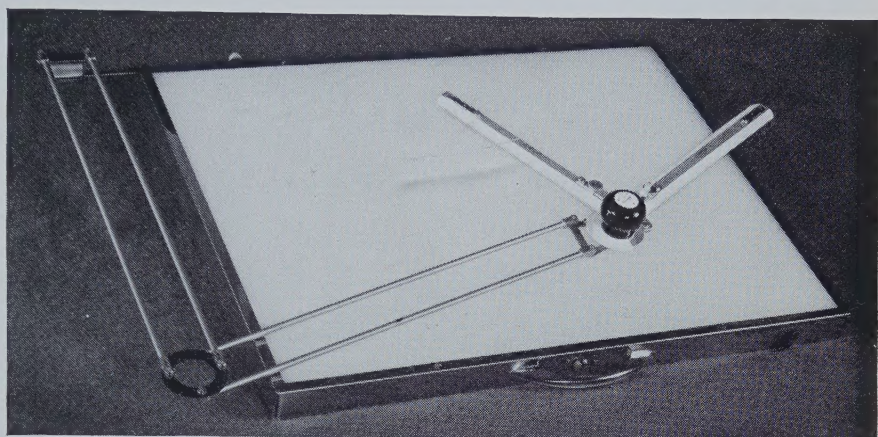
FROM OZALID®

to help you
do your job
even better

These work-savers from Ozalid do more than save you time, trouble and money. They also give you an end result that's top quality by *anyone's* standards.

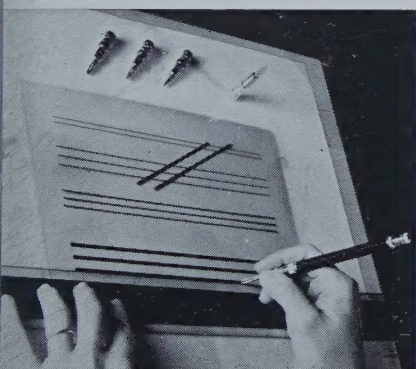
For samples or a demonstration, get in touch with your nearest Ozalid man, or write Ozalid, Johnson City, N. Y.

Ozalid, A Division of General Aniline & Film Corp., Johnson City, New York. In Canada: Hughes-Owens Co., Ltd., Montreal



Trace at your drawing board. New Porta-Trace is lightweight, illuminated. Less than 2" thin, can be used with drafting machine or under string-type parallel rule. Ideal for inspection of textiles, papers, films. Stores on end like a book. Five sizes.

Cut drafting time and work, maintain perfect *accuracy* with a Nestler drafting machine. No need to juggle T-squares, triangles, scales, and protractor. Built-in hatching. Adjustable zero point. Positive scale locks. Seven different models.



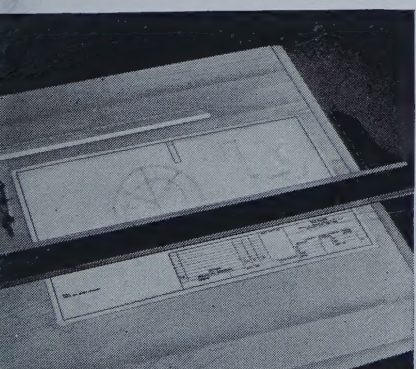
1000 feet on one filling. Grafika universal drafting pen, with unique capillary ink control, gives long, even flow; no blotting or line spread. Precise line-width settings. With only 11 nibs, Grafika covers full scope of ink drafting.



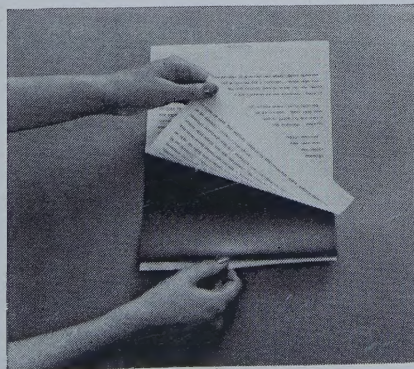
Wipe-clean drafting film. Duratrace, made with Du Pont Mylar®, is also tear-proof, erasable, dimensionally stable. Velvet-smooth drafting surface. Perfect master for design drafting, printing circuit masters, comparators, map making, etc.



Finest repro black carbon film. Dura-trace® Carbon has highly opaque coat, tough Du Pont Mylar® base. Superb backing for extra-clean, sharp, high-contrast masters. Use also for mechanical negative and overhead projection.



Tracing vellum for top results. Dra-trace stands up under erasures, rough handling, aging. 100% rag content is permeated with new water-clear resin, won't yellow, won't break. Gives high repro speed, excellent contrast, fine prints.



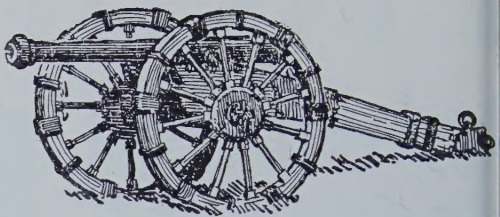
To simplify preparation of originals for whiteprint repro, use Transalid Translucent Master Sets. They combine Ozamaster translucent bond and opaque carbon paper in handy unit. Quick, clean, sure. You'll wonder how you got along without them.



For easy-read whiteprints, carbon-back your originals with Ozalid opaque carbon papers. Distinctive orange color prevents light leaks. Gives you sharp, clear prints with strong image-to-background contrasts . . . perfect copies every time!

Military Engineering Documentation

by W. S. Hutchinson



Defense Drawing Practice Industry Advisory Committee, Cont.

LAST MONTH in this column I described the first meeting of the reconstituted Industry Advisory Committee on Defense Drawing Practice. That meeting was held October 31 in Washington, D.C., with 35 military, industry and university representatives present.

The following reports given there summarize the current status of projects within the scope of the Standardization Plan for DOD Standard Drawing Practices, covering fiscal years 1960, '61, and '62.

ACTIVE PROJECTS

ARMY REPORT: By Mr. Chester Nazien, Frankford Arsenal, Ordnance Corps.

Electrical Schematic Diagrams—It is intended to adopt the standard developed by the ASA Subcommittee Y14.15. However, it appears that some changes will be required to make the standard completely cover military requirements.

MIL-STD-16B (Revision); Electrical and Electronic Reference Designations—Draft was circulated for comment by Signal Corps in August 1960.

Gears, Drawing Requirements — First circulation of draft is expected by 15 November 1960.

MIL-STD-1 (Revision); General Drawing Practice—Draft is scheduled for circulation in second quarter of fiscal year 1961.

Mr. Hutchinson is Assistant Chief, Mechanical and Engineering Program Branch, Standardization Division, Armed Forces Supply Support Center.

MIL-STD-24A (Revision); Revision of Drawings — Transportation Corps is compiling information.

Managerial and Administrative Control of Engineering Documentation—Progressing on schedule; study has disclosed good "pay-dirt"; will continue project and bring conclusions before the Industry Advisory Committee.

Requirements for Engineering Documentation Storage—Draft will be circulated for comments by 15 November 1960.

Drawing Numbers and Part Numbers—Circulated for comment middle of October 1960; will study systems in use and propose a single system.

Engineering Data Documentation

System (EDDS-0001) — Engineering practices study to appraise detailed requirements for technical documentation of the Department of Defense is in the planning stage.

Navy Report: Reported by Mr. Stewart Miller, Bureau of Naval Weapons.

MIL-STD-17 (Revision); Mechanical Symbols—Preliminary draft has been circulated to the military services for comment.

MIL-STD-15A (Revision); Electrical and Electronic Symbols—This project ties in with similar standards developed by IRE and by IEEE, and will be developed cooperatively with these industry groups.

MIL-STD-22 (Revision); Welded

TERMINATED PROJECTS

Project No.	Title	Disposition
601-90	MIL-STD-24 (Change Notice 1); Revision of Drawings	Completed
706-48	Tabular Data on Engineering Drawings	Discontinued
X999-0006	MIL-STD-9; Screw Thread Conventions	Completed
DRPR-0002	MIL-STD-2; Engineering Drawings, Sizes and Formats	Completed
DRPR-0008	MIL-STD-3; Format for Production Drawings	*Superseded
DRPR-0009	MIL-STD-4; Format for Construction Drawings	*Superseded
(NOTE: DRPR-0004	*MIL-STDs-2, 3 & 4 were combined into MIL-STD-2B)	
DRPR-0026	MIL-STD-33; Lubrication Diagrams	Completed
DRPR-0032	Visual Aid (Motion Picture)—explaining MIL-D-70327	Completed
DRPR-0020	MIL-STD-30A; Associated Lists, etc.	Completed
DRPR-0039	Tabular Data on Engineering Drawings	Deleted
DRPR-0023	Armed Services Procurement Regulations, etc.	Discontinued
	MIL-STD-34; Preparation of Drawings for Optical Elements and Optical Systems	Completed
	(Not Shown In Plan)	
DRPR-0037	MIL-STD-32; Status Notes for Use on Military Sheet Form Standards	Completed
6650-0004	MIL-STD-1241; Optical Terms and Definitions	Completed

Joint Design—It is expected to complete project by the third quarter of fiscal year 1961.

MIL-STD-19 (Revision); Welding Symbols—It is intended to adopt the industry standard (AWS) in accordance with DOD policy.

MIL-D-70327 (Revision); Drawings, Engineering and Associated Lists—Revised draft has been circulated, and industry comments are due in second quarter of fiscal year 1961.

MIL-STD-280 (Revision); Definition of Terms for Equipment Division—Preliminary draft will be circulated about January 1961.

MIL-STD-8B (Revision); Dimensioning and Tolerancing—Comments are under review.

MIL-STD-7 (Revision); Types and Definitions of Engineering Drawings—Sample illustrations are being replaced for improvement; suggested definitions of terms are being added; draft is expected to be ready for circulation by March 1961.

MIL-STD-20 (Revision); Welding Terms and Definitions—Same as report on MIL-STD-19.

Air Force Report: Reported by Mr. Daniel Bennett Jr., Headquarters Air Material Command.

Undimensioned Drawings and Printed Wiring—Presently consolidating industry and military comments of draft specifications. Expect to call an industry-military meeting in March 1961 to reconcile differences.

Handbook for Sheetmetal Details—Military meeting held in April 1960 at which AMC Manual received concurrence for a MIL-Handbook to possibly replace present DOD project. Further study will be made before final resolution.

MIL-STD-12B (Revision); Abbreviations for Use on Drawings, etc.—Comments have been received from industry and Air Force activities, and are being assembled into a proposed draft for circulation.

MIL-STD-28 (Revision); Drawing Titles, Approved Method of Assignment—Work is beginning in November 1960.

Handbook on Procedures to be Followed by Contractors in Preparing Contractor Design Activity Standards—Air Force (AMC) is assembling information for a draft for study by the military services.

DRAFTING TRENDS



This is a size comparison between the 10" POST Versalog and its 5" replica, the POST Pocket Versalog.

The trend to "COMPACT" slide rules

Why a small slide rule?

Users of America's best-selling Post Versalog, in the regulation 10" desk size, have been known to covet a 5" Post Pocket Versalog, and even buy one . . . as a more easily carried convenience . . . as a spare . . . or just for the sheer joy of having, like a gun collector, a "matched pair."

It took more than requests from pleased users of the 10" Versalog to convince our marketing people that the need actually existed for a premium-priced 5" pocket rule with 23 scales. Our technical men were even harder to convince that high Versalog standards of accuracy could be maintained in miniature.

Who can use them?

That there is a need has since been proved by the thousands of engineers, architects, scientists, and students who have bought and used a Post Pocket Versalog in preference not only to the larger version, but

after comparing it with other smaller makes.

As to accuracy, we are still amazed at the exquisite job our production team has done in miniaturization—the 5" Pocket Versalog includes every one of the 23 scales found on its much larger counterpart and, in addition, bears engine-divided calibrations of such sharpness and clarity that no magnifier is needed.

Own a Versalog for less

To further popularize this fine instrument, Post dealers are offering it at a special low price for a limited time. All models come with a hand-crafted leather case and spring pocket clip. Also available with hard-bound instruction text.

For further information, ask your Post dealer. Or, for free literature, price data and name of nearest dealer, write to Frederick Post Company, 3656 North Avondale Avenue, Chicago 18, Illinois.



SENSITIZED PAPERS & CLOTHS • TRACING & DRAWING MEDIUMS • DRAWING INSTRUMENTS & SLIDE RULES
ENGINEERING EQUIPMENT & DRAFTING SUPPLIES • FIELD EQUIPMENT & DRAFTING FURNITURE



Types of Technical Drawings

by Franz Maria Feldhaus

IN ADDITION TO architectural drawings, the sketch books of technicians are valuable documents in uncovering the history of technical draftsmanship. Since libraries in Europe collected free hand sketches, they must have had quite a number of them in their possession. And during the fight of the Church against pictorial representation which raged during the Eighth Century, many of them must have been destroyed. Only a few examples are in existence today.

To-day we possess only very few handwritten documents of technical drawings dating back to Moham-medan times. It is interesting to see how peculiarly these were drawn. All objects were presented on the same plane. Cogwheels were drawn by joining two flat circles, the teeth indicated by points.

The most significant sketchbook still surviving was written around 1245 by the Frenchman Wilars from Honnecourt in Picardie during a journey which took him to Hungary. The document begins with the words: "Wilars de honecort greets you and begs all who are occupied in the various fields dealt with in this book to pray for his soul and to remember him." In this book one sees not only good architectural drawings but also a drawing of a perpetuum mobile, a saw which would evenly cut off under-water foundation posts and also the illustration of a saw mill. Let us look closely at this drawing and see what difficulties a technician had to face 700 years ago when trying to put down a complicated machine on

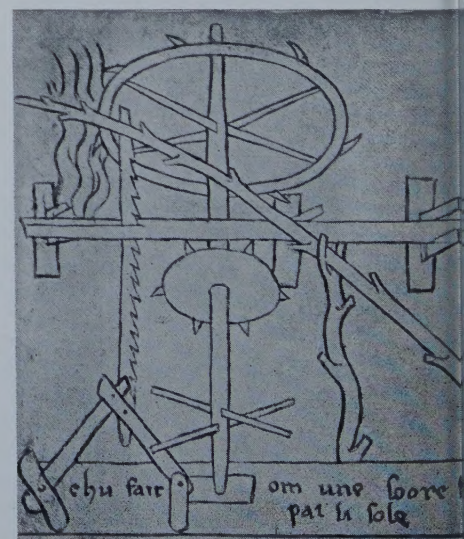
paper. The picture of the saw mill which Wilars saw at an unnamed place has the following caption: 'This is how one builds a saw which saws by itself.' We have to turn the paper by 90 degrees if we want to bring the waterlevel into horizontal position. The water undershoots the paddles of the waterwheel. On the axle of the wheel there are 4 cams which press against a lever mechanism when spinning round and pull the blade of the saw down. The saw is suspended at its upper end from a springy bough. The contrivance was certainly different, but this sketch was sufficient for him to remember the whole construction in all its details.

There is also a disc, with points, on the axle of the waterwheel which moves the beam against the blade of the saw. How careless this sketch is can be seen by the angle of the paddles towards the water. The main axle would not move the beam towards the saw but in the opposite direction. Apart from that the beam would be moved too fast. A sketch is far better, perhaps because Wilars, like all masterbuilders of his time, received his architectural and statistical schooling in a building works.

Gothic building technique was at that time at its height. The cathedrals in Vienna (1144), Paris (1163), Magdeburg (1208), Reims (1212), London (1245) and those in many other cities, demanded innumerable constructional drawings for their intricately jointed parts. There are drawings on vellum dating from about 1440 of the Vienna Stephansdome

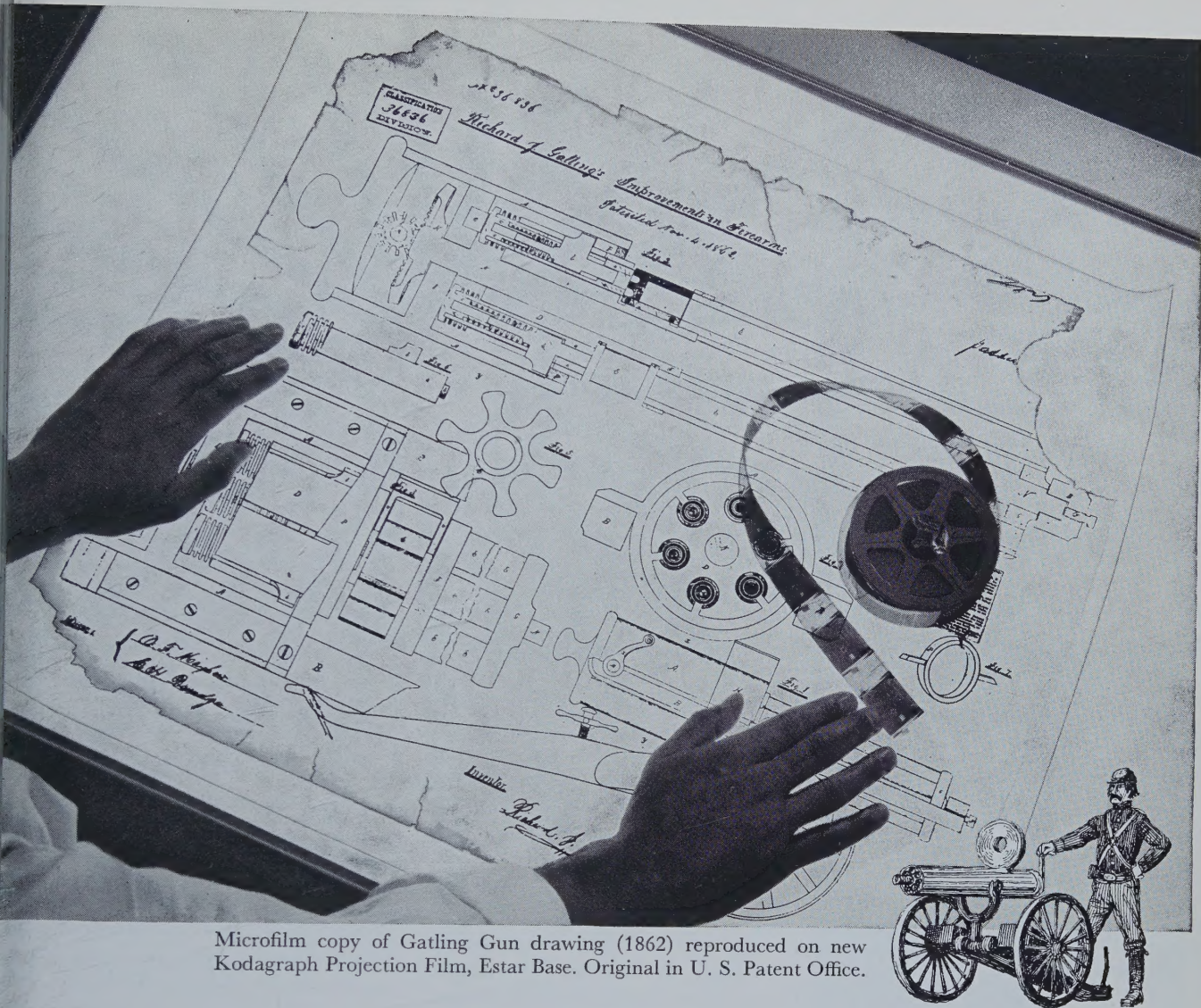
This is the first part of Chapter III of an authoritative and beautiful book, **THE HISTORY OF TECHNICAL DRAWING**, by Franz Maria Feldhaus published in 1959 by Franz Kuhlmann, K.G., of Wilhelmshaven, Germany as **GESCHICHTE DES TECHNISCHEN ZEICHNENS**. We are indebted to the publisher for the translation, as well as for permission to re-publish this fascinating work. It will be continued in this department from month to month, until completed.—The Editors.

and of the cathedral in Munster (about 1350). Large sheets of the dome in Cologne were found in 1814 in a guest house in Darmstadt, some others two years later by chance in Paris. How many old and valuable drawings may have been found in some attic and carelessly destroyed!



SAWMILL with waterwheel and automatic feed.

(Drawing from the travelling sketchbook by Wilars, about 1245. National Library, Paris.)



Microfilm copy of Gatling Gun drawing (1862) reproduced on new Kodagraph Projection Film, Estar Base. Original in U. S. Patent Office.

Big Blowup from microfilm!

New Kodagraph Projection Film, Estar Base, produces change-in-scale intermediates that will stand up under the heaviest use in drafting room or print-room.

Blowups from microfilm—or reductions of drawings and maps—are remarkably sharp and clean on a whiter base that has a “built-in” longer life.

Production is easy. This new high-contrast, quick-processing film can be exposed in enlarger, projection printer, process camera . . . and handled with “1A” safelight. Wide latitude all but ends make-overs.

See this versatile new Kodagraph Film—and the others in the new *Estar Base* line: Kodagraph Contact Film; Kodagraph Auto-positive Film.

All combine reliable Kodak emulsions on the new Estar Base—highly translucent, durable, and dimensionally stable, with excellent matte surface on both sides for easy drafting. Available in standard drawing sheet sizes and in rolls up to 52 inches wide. Call your local Kodagraph Dealer, or write Eastman Kodak Company, Graphic Reproduction Division, Rochester 4, N. Y.

NEW!

Kodagraph

REPRODUCTION FILMS

*for better line-for-line
reproduction*

Kodak
TRADEMARK

SAFETY INSURANCE

for

VALUABLE DRAWINGS

WEILCO

AQUATONE

WASHABLE VINYL PLASTIC

DRAWING BOARD

COVER

*Protects Your Important
Drawings from Damage*

No
Dust

No
Grime

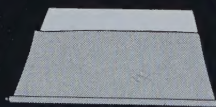
No
Smudge

No
Loss

Aqua
Color



**ROLL
SIDEWAYS**



**ROLL
DOWN**

No. 1575

BOARD SIZES

24" x 36" to 48" x 126"

1 STICK & 2 STICK

ALSO SPECIAL SIZES & 12 YARD ROLLS

**FREE
SAMPLE**

WRITE ON YOUR
COMPANY LETTERHEAD
GIVING YOUR TITLE

J.H. WEIL Co. 

1332 CHERRY ST. • PHILA. 7, PA.

Notes & Comment

Ferris Institute:

Two Programs Announced

THE VISUAL Reproduction Department of Ferris Institute, a Michigan State College in Big Rapids, is now accepting applications for enrollment in the Visual Reproduction Technician Program beginning in the Spring term. This represents an enlargement of the program, with new students being admitted to the Graphic Reproduction program both in the Fall and Spring.

This course, like the industry-sponsored week-long Reproduction Techniques Training Programs offered during the summer at Ferris, is the only one of its kind.

It covers all phases of graphic reproduction, including diazo-blueprint, photocopy, process camera, contact and projection reproduction photographic techniques, microfilm, electrostatic (Xerox) process, and offset duplicating, plus certain basic college courses.

Starting with the week of June 12, 1961, Ferris is again conducting a group of training programs in these fields. Summer programs are being improved, according to Dean Jon P. Adams, over those offered last year. In the first case, two types of programs are being offered: (a) Orientation programs consisting of lecture-discussion, and workshop demonstrations of processes normally found in the industry, directed to the needs of salesmen and plant employees who can profit from general overall understanding of principles. And (b) More intensive refresher, or re-training programs, which will not deal with

"basics" but specifics. The schedule:

June 12—Miniaturization of Engineering Drawings
June 19—Orientation in Reproduction Processes
June 26—Process Camera and Related Photographic Techniques
July 10—Offset Duplicating
July 17—Miniaturization of Engineering Drawings
July 24—Two week Reproduction Training Program
August 7—Miniaturization of Engineering Drawings
August 14—Offset Duplicating (Tentative)
August 21—Orientation (Tentative)

Complete information can be obtained from Jon P. Adams, Dean, Industrial and Trade Division, Ferris Institute, Big Rapids, Michigan.

Weekly Visucom Programs

IN THE EAST, Tecnifax Corporation, Holyoke, Mass., has announced that it is now conducting its own "Visucom" Program weekly in its Holyoke factory. The programs (conducted bi-weekly since 1958) train participants in visual communication skills, with emphasis on overhead projection. Projectural design and production, development and realization of visual concepts, and the psychology of communication, are basic subjects.

This program is offered without charge to participants from industry, education, government, and the armed forces. Small class, one-day, three-day, and five-day courses permit individual attention to special problems and needs of participants.

A descriptive brochure, as well as registration forms, may be obtained by writing to Fred J. Pula, Director of Visucom Program, Section GS-NR, Tecnifax Corp., Holyoke, Mass.



ALL MARS - ALL TOPS

.... all imported from West Germany, made to meet the highest standards of professionals.

the pencil that's as good as it looks

MARS

J.S. STAEDTLER, INC.
HACKENSACK, NEW JERSEY

Mars products are available at better engineering and drafting material suppliers everywhere.

DO YOU WANT A PROMOTION?

Down-to-earth advice from a supervisor

by G. H. Taylor

AMBITION, intelligence, and youth are the qualities usually sought when a company attempts to recruit drafting room personnel. The object is to build the organization from the ground up, and to staff it with people who can be trained in the methods and procedures of the company. As a matter of fact, the work in some industries is so specialized as to preclude the hiring of persons who have had other experience or training.

Ambition, properly contained and reasonably directed, is a valuable asset, and much to be sought. However, there is nothing more debilitating than frustrated ambition. And too many people, by not applying their full talents never do achieve their goals.

As a matter of course, the man who wishes to advance, either to the next rung up the ladder, or to supervision, must first become thoroughly proficient in his attained position. Obviously, one who is not yet doing a good job on his assigned duties is not to be considered for promotion. He must also display a recognizable degree of enthusiasm for the work, for the company, and for his associates.

There are some jobs in which additional monetary benefits are the only rewards for a good day's work. Drafting is not one of them. There are well defined steps for the advancement of a draftsman. A man hired as a tracer logically becomes—according to his ability and his company's requirements—a detailer, a layout man, and then a designer. It should also be pointed out that the positions of checker, and lead man or group leader, are also available when the particular attributes needed for these positions are exhibited.

Prime requisites for advancement

are the ability and the willingness to take on additional responsibilities and higher level work. Many people have the erroneous idea that one should first be given the higher status, and then be allowed to prove that the advancement was justified by doing the job. Experience in several fields of endeavor has proved that this is the wrong approach.

The man who achieves advancement is the one who already is doing at least a part of the work in the next higher rank. When the question is presented as to who will be promoted, the decision is made for the individual who has already demonstrated his ability and willingness to perform. When a man refuses or is unwilling to do work of a higher classification because he isn't paid to do so, he will surely stagnate wherever he may be.

A supervisor, faced with the need to secure additional help, first searches for someone with experience in the work. This holds true whether this person is to be hired from the outside, or promoted from within. Modern supervision, however, recognizes without question that promotion from within is by far the most satisfactory means of filling a vacancy.

This is true for many good reasons. Among these are the employee's known work habits, intelligence, and capabilities. Also, other employees, seeing that promotion is attainable are spurred to greater efforts. Loyalty to the firm is generated. Experience in product lines, company policies and company methods is fully utilized.

Another prime requisite for advancement is continual furtherance of one's education. This may be formal or informal, but it is essential for continued growth. Many companies today pay for, or reimburse for, courses connected with the employ-

ee's line of work and pursued at recognized facilities. Even in firms not having such a plan, the employee who pursues his education on his own initiative is undoubtedly preparing himself for opportunity, and his employers will surely recognize his efforts.

If you happen to work with a company which has a suggestion program, a ready-made horn is available to blow. Intelligent and profitable suggestions, whether or not remunerated on the spot, place one in an enviable position for recognition. As a general rule, the Suggestion Committee consults with the proper department head as to the value of a suggestion, and since the department is always on the lookout for bright young people, he takes due notice if the suggestion is a good one.

While talking about suggestions, one comment cries aloud to be made. When the boss makes a suggestion, and it is obvious that he has given it some thought, it must be vigorously and enthusiastically carried out. This is not to say that you cannot voice a difference of opinion. But once the decision is made, it should be adopted as though it were your own.

Obviously, there are other things which may be done to secure promotions. If the foregoing suggestions are heeded, however, you will be in a position to take advantage of opportunities as they arise. "Breaks" do not occur. A "break" is an opportunity which one is in a position to grasp, and the fact that you are must be known.

The Author

G. H. TAYLOR is Chief Draftsman for Leland Airborne Products, Vandalia, Ohio.

Significant Drawing Numbers

The breakdown of a weapons system into its major segments predicated the type of numerical sequence described here

by S. P. Waddill

SIGNIFICANT drawing numbers can best be defined as a group of characters or digits which are coded to represent desired characteristics.

The characteristics to be coded may vary from very elementary cases, whereby a block of numbers is assigned for a particular group of drawings, to more complex cases for systems, whereby model, segment, location, function, assembly sequence and other relationships are coded.

The degree to which drawing numbers are coded is dependent upon the uses which can be derived. These might be:

(1) To provide a ready identification or association of the drawing by using personnel.

(2) To segregate groups of drawings for recording, processing, distribution, filing and reference.

(3) To provide the means of mechanically sorting and processing data through Electrical Accounting Machines (EAM) and Electronic Data Processing Machines (EDPM).

(4) More specific purposes as necessitated by individual needs.

For the majority of its engineering drawings, The Martin Company uses a drawing numbering system which is predicated upon the breakdown of a

weapons system into its major segments. Due to the variation in products for which Martin contracts, the basic breakdown and coding must sometimes be tailored to the particular type of system or equipment.

Other drawings pertaining to company standards, procurement items, etc., and specifications pertaining to items such as materials and processes are also coded to represent varying categories.

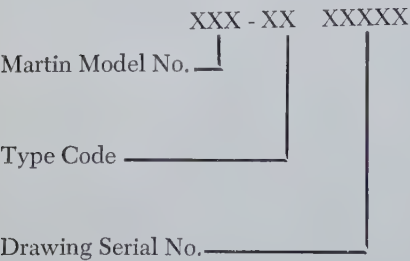
THE SYSTEM

THE BASIC system used by Martin in establishing significant num-

bers for both preliminary and manufacturing drawings is explained below.

PRELIMINARY DRAWINGS

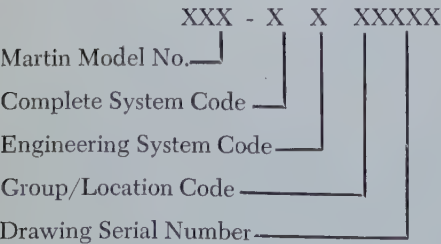
PRELIMINARY drawings (i.e., those which are not used for manufacturing) are coded as follows:



- Drawing-type codes include:
- 00—Preliminary Design, Sales, Approval, etc.
 - 01—Wind Tunnel, Display Models, etc.
 - 02—Mockup
 - 03—Layout
 - 04—Sketch
 - 05—Engine Test
 - 06—Test (other than Flight or Instrumentation)
 - 07—Flight or Instrument Test
 - 08—General (Inboard Profile, Manufacturing Breakdown)
 - 09—Lines—Fuselage, Wing, etc.

MANUFACTURING DRAWINGS

MANUFACTURING drawings are coded as follows:



Breakdowns of the three manufacturing drawing codes are showing on the right.

Serial Numbers are arranged to satisfy manufacturing sequence, when applicable. Two examples are shown on the opposite page.

THE THREE MANUFACTURING DRAWING CODES

COMPLETE SYSTEM CODE

1. Operational System
2. Air Vehicle
3. Support Echelon No. 1
4. Support Echelon No. 2
5. Support Echelon No. 3
6. Support Echelon No. 4
7. Support Echelon No. 5
8. Maintenance/Depot
9. Training

“Support Echelons” may be elected to represent geographical areas, successive activity areas, installations, complexes, etc.

ENGINEERING SYSTEM CODE

1. Structure	(Airframe, Housing, Rack)
2. Armament	(Payload, Defense Protection, Pyrotechnics)
3. Mechanical Controls	(Fluid Systems, Actuation Pneumatics)
4. Propulsion	(Engines and Accessories, Propelling Devices, BLC)
5. Electrical	(Illumination, Generators, Interconnecting Cables other than Electronic)
6. Electronic	(Navigation, Guidance, ECM and IR, Simulation, Tracking, Range Safety)
7. Equipment	(Special Tools, Instruments other than test, Handling Devices, Support Vehicle, Furnishings)
8. Instrumentation	
9. Training	(Unit, Chart, Graph)

GROUP/LOCATION CODE

Air Vehicle	Support Echelon
1. Fuselage/Stage No. 1	Mobile/Shelter
2. Fuselage/Stage No. 2	Handling/Hoist/Tools
3. Fuselage/Stage No. 3	Power Source
4. Fuselage/Stage No. 4	Checkout
5. Nacelle	(Alternate or Spare)
6. Center Surface	Launch
7. Outer Surface	(Alternate or Spare)
8. Auxiliary Surface	Test/Instrumentation
9. Miscellaneous	Miscellaneous

PREASSIGNED NUMBERS

(1) Major Drawings

XXX-1000000	Operational System—Complete
XXX-2000000	Air Vehicle—Complete
XXX-3000000	Support Echelon No. 1—Complete
XXX-4000000	Support Echelon No. 2—Complete
XXX-5000000	Support Echelon No. 3—Complete
XXX-6000000	Support Echelon No. 4—Complete
XXX-7000000	Support Echelon No. 5—Complete
XXX-8000000	Maintenance/Depot—Complete
XXX-9000000	Training—Complete

(2) Miscellaneous Drawings

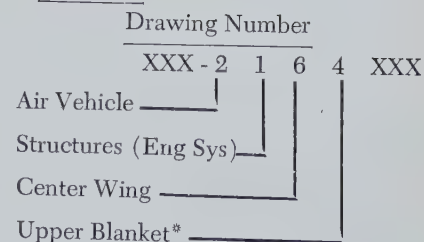
XXX-X000002	Exterior Finish and Insignia Marking
*XXX-X000003	Lubrication List—Detail
*XXX-X000004	Finish Specification
XXX-2000005	Emergency Exit Markings
*XXX-2000006	Aerodynamic Smoothness and Flushness Requirements
*XXX-X000008	Identification and Modification Nameplate Chart
*XXX-X000009	Manufacturing and Control Point Sequence
XXX-X000011	Lubrication Chart
XXX-X000012	Placarding—Interior
XXX-X000013	Placarding—Exterior
XXX-X000014	Placarding—Stenciling
XXX-X000016	Loose Equipment, Installed
XXX-X000017	Loose Equipment, Not Installed
*XXX-X000022	Interchangeability-Replaceability Working List
*XXX-X000023	Model Usage and Effectivity Data

*These drawings release no parts or material.

DASH NUMBERS

TYPE OF PART		PART NUMBER
Detail	Shown, No Opposite	XXX-XXXXXXX-1, 3, 5, 7, 11, 13, etc.
	Shown	XXX-XXXXXXX-1, 3, 5, 7, 11, 13, etc.
	Opposite	XXX-XXXXXXX-2, 4, 6, 8, 12, 14, etc.
Subassembly, Assembly or Installation	Shown, No Opposite	XXX-XXXXXXX-9, 19, 29, 39, 49, etc.
	Shown	XXX-XXXXXXX-9, 19, 29, 39, 49, etc.
	Opposite	XXX-XXXXXXX-10, 20, 30, 40, 50, etc.
Casting Blank Requiring Mach	Shown, No Opposite	XXX-XXXXXXXG1, 3, 5, etc.
	Shown	XXX-XXXXXXXG1, 3, 5, etc.
	Opposite	XXX-XXXXXXXG2, 4, 6, etc.
Forging Blank Requiring Mach	Shown, No Opposite	XXX-XXXXXXXF1, 3, 5, etc.
	Shown	XXX-XXXXXXXF1, 3, 5, etc.
	Opposite	XXX-XXXXXXXF2, 4, 6, etc.

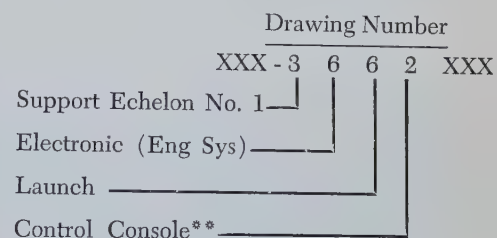
Examples



*Coordinated Code

(Mfg. sequence applicable)

- 1—F Spar
- 2—R Spar
- 3—Auxiliary Spar
- 4—Upper Blanket*
- 5—Lower Blanket
- 6—LE
- 7—TE



**Coordinated Code

(Mfg. sequence applicable)

1. Command Console
2. Control Console**
3. Flight Control Console
4. Engine Control Console
5. Other

MAJOR DRAWINGS

MAJOR drawings (on top drawings of weapons system segments) and certain miscellaneous drawings which are usually prepared for all contracts are readily identified by pre-assigned drawing numbers as shown above left.

The basic drawing number plus dash numbers are used to identify sub-assemblies, tabulated items and other parts detailed on the drawing.

Dash numbers of the drawing number are assigned as show below, left.

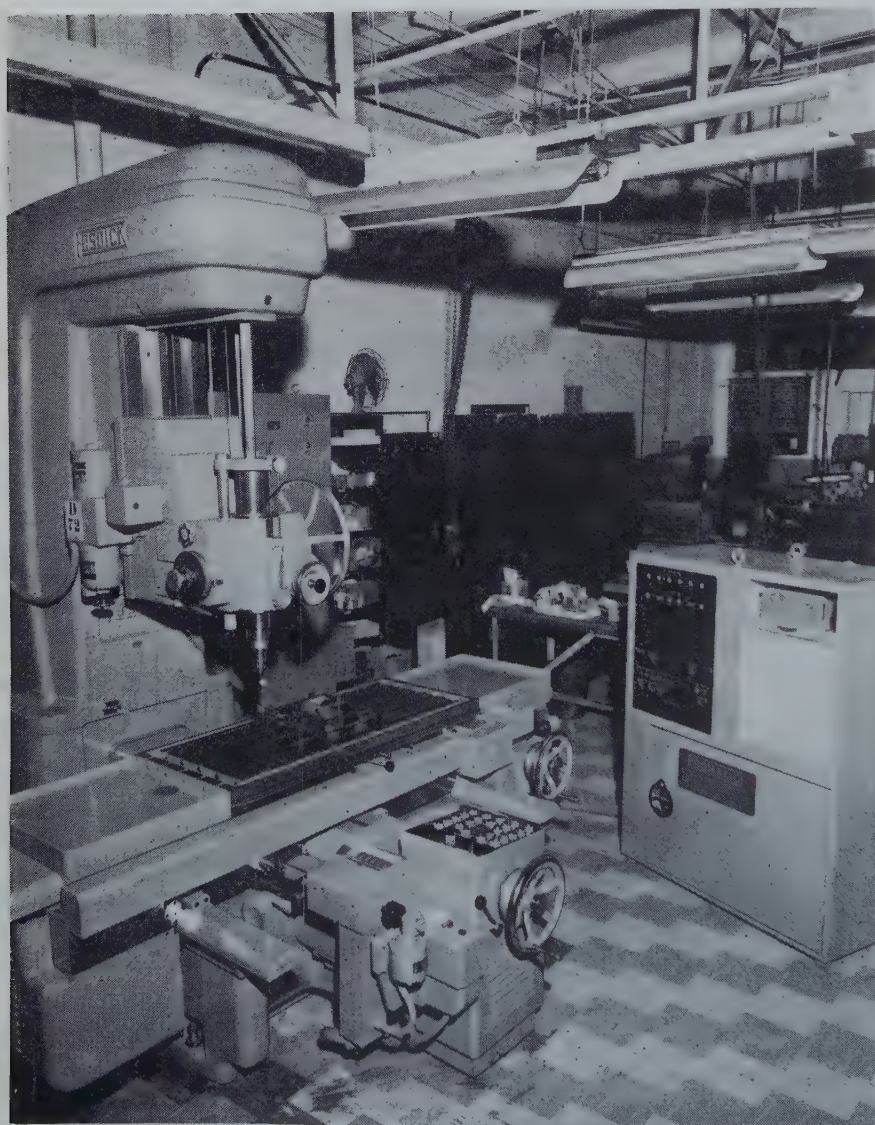
The Author

SAMUEL P. WADDILL is senior management engineer, Industrial Relations Division, The Martin Co., Baltimore Division, Baltimore 3, Maryland. As a group supervisor, Mr. Waddill is in charge of the preparation of Corporate, Divisional, and Engineering procedures, and publication of the Drafting Room Manual.

Graphical Communication Problems

Drafting for numerical control machining, and simplified drafting have posed difficulties requiring exploration and solution

by Earl D. Black



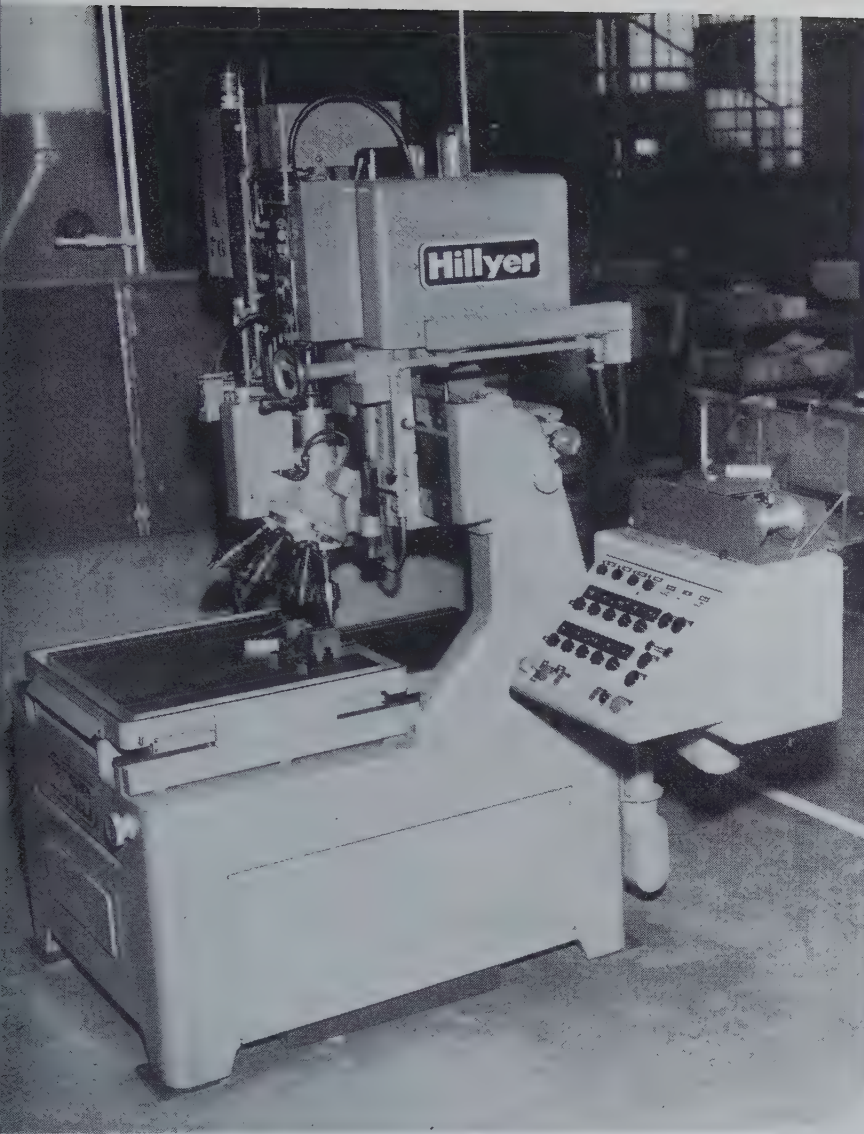
THE FOSDICK Jig Boring Machine is utilized to machine precision parts for fixtures, dies, and other tooling that requires locator work. (A. C. Spark Plug Div.)

CONVENTIONAL, high quality production drawings in industry are not likely to be replaced as the basic language of communication within the foreseeable future. There is a definite need, however, for the various other methods and techniques of graphical communication being used today by the engineer, designer, draftsman, and technician.

For example, the production drawing serves to communicate specifically and precisely between workmen who are geographically scattered and who are engaged in manufacturing the components of a common product. Patent and explanatory drawings serve to relay non-manufacturing information and concepts. Freehand drawings and sketches are used for prototype work within a plant, section, or between individuals functioning as a development team. All three kinds of drawings must be executed quickly and accurately without duplication of drawing effort; in no case is there a license for carelessness.

In recent years industrial organizations have been concerned with reducing the time and effort devoted to drawing production. Two approaches in particular have received considerable attention, but a number of difficulties have yet to be explored.

This discussion will consider some of today's problems of graphical communication as applied to numerical control machining and to simplified drafting in large organizations made



THE HILLYER MACHINE is being used to produce production parts of low volume, which require numerous holes of various sizes. This machine has an 8-spindle turret which gives the flexibility of eight sizes of holes, or, if some of the holes need to be tapped or reamed, the operation can also be performed. (A. C. Spark Plug Division)

p of multiple divisions, plants, and associated vendors.

NUMERICAL CONTROL

THE USE of numerical control machining requires new concepts in drafting procedure and standardization. There are at least two obvious requirements.

Dimensioning for all parts in the same assembly requires a common axis, station line, or reference point. Product engineers, process engineers, and production engineers involved in manufacturing a given product must have a common dimensioning concept. Each must understand the problems of the other, for complete unity is necessary where numerically con-

trolled machines are being used.

Product engineering and production engineering must be coordinated. This is the job of process engineering. Drawings prepared for parts to be machined on three-axial, numerical control machines, must have at least two orthographic views. One view normally shows the plan or profile view, and the second view should show the depth of machining operations. The number of points to be used in the numerical control machine is determined by the designer. Programmed machine control data may be provided on the initial engineering or tool design drawings.

Drawings prepared for use in numerically controlled programming may be made on glass cloth. How-

ever, drawings on conventional vellum are sufficiently accurate to check point coordinates and functional accuracy of a given design. Plotting of points and orthographic views of the part may be made prior to setup on the numerical control machine. Casting, stamping, and forging process drawings may change only slightly from the present conventions inasmuch as new surfaces of registry (reference points) may be determined by the numerical control programming requirements.

In light of these requirements, the development of numerically controlled machines and the desirability of using them with automatic machine production processes should be carefully evaluated by designers.

"SIMPLIFIED" DRAFTING

SIMPLIFIED DRAFTING is being advocated in some industrial areas as a time-saving method of drawing production. But what may be a simplification to one working group could be confusion to others. Simplified drafting is measured in two directions. There are those who strip the conventional drawing of accepted details (views, arrowheads, etc.); others invent new symbols to replace more detailed concepts. Often the result is a confused workman on the job.

Accuracy of communication continues to demand that drawings be clear and complete. General specifications should permit flexibility of processes necessary for production. Extreme simplification on drawings requires new and numerous symbols and rules. It is doubtful that over symbolization of drawings provides any real saving of time when the total use of prints is considered.

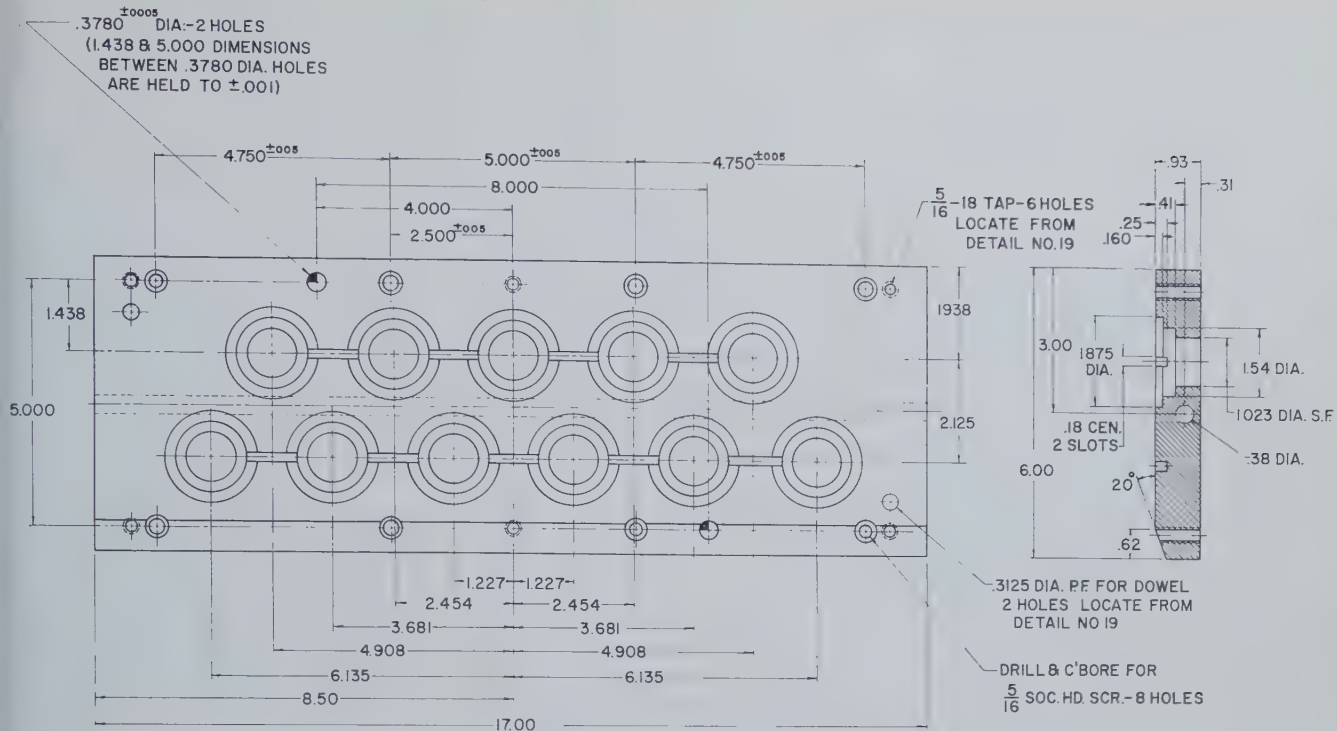
GENERAL MOTORS PRACTICES

GENERAL MOTORS Corporation has a standing committee on engineering standards. It is this committee and its subcommittees which function as the authorities within General Motors Corporation in respect to all engineering standards. The GM Engineering Drawing Subcommittee supports the stand taken by ASA, SAE and ASEE organizations. These national organizations have repeatedly rejected radically simplified drafting proposals as being not in the best interest of establishing

Courtesy, AC Spark Plug Division, General Motors Corp.

[illegible]

portion, and full concept of the design. This does not mean that the freehand drawing has no place in industry. Being able to make good freehand drawings and sketches is an important skill, especially in early design stages. The engineer uses such drawings strictly as a means of com-



municating ideas and recording designs that might otherwise escape into oblivion. If he is supervising the design, he augments the sketch or free-hand drawing by conversation, catalog information, written specifications, and often actual parts which suggest new ideas. The final drawing is usually complete in every detail.

Industry cannot exist today without numerous exchanges of prints between the vendor and control divisions. The drawings must speak a common language and be self-explanatory to all readers to be most useful.

We can take considerable satisfaction in the development of new approaches and short-cuts in drafting production. Material and process specifications are being coded to drawings by number. The use of the code number on the drawing reduces typing or drafting time where the supplier is furnished a copy of the code book. The code book spells out specifications in detail rather than placing them on the drawing.

Master drawings are made of parts having several variations. Intermediate prints are used to give complete instructions for each detail using the master as a beginning.

Drafting production is performed by photographic duplicating methods. Special templates, rubber stamps, typewritten parts and stock lists, printed title blocks, drawing stickers,

and printed standard general notes are used extensively to shorten the work of the drafting departments. Needless views and details are also discouraged.

It is common practice in the automotive industry to make numerous prints of each drawing where parts are placed in production. There is no accurate way of estimating the time or how many people use them. Each divisional use of a product increases the number of prints and reading time.

The practice of photographing and storage of drawings raises the standards of linework and lettering required. Prints made from these photographs lose further intensity. Therefore, the original drawing must meet the requirements of such print production processes. A good first drawing may save much time and expense in redrawing or touch up.

Elaborate and useless pictorials, shading, and repetitive detail is a waste of time. Accurate word description is used to eliminate the diffuse projection of views when notes or specifications can be clearly and unmistakably given on the drawing. Section lining on design layouts is used only when it will add to clarity and design concepts.

Unity in design concept and co-ordination between the product engineer, process engineer, and production engineer is a definite requirement

in industry today. The quality of drawings used and expected of the draftsman today is far superior to the accepted quality of just a few years ago, especially in technical dimensioning, tolerances, limits and specifications. Drawings should be executed quickly and accurately. Drafting effort should be kept at a minimum, but not at the expense of completeness which may greatly increase reading difficulty. Drawings must be of sufficient intensity, in both linework and lettering, to meet the requirements of new duplicating methods. Otherwise, high production methods may produce large quantities of unusable and expensive parts before an error is discovered.

Unquestionably, advances are going to be made, both in reducing time and effort devoted to drawing production and in improving drawings as a communication medium. As changes are proposed, however, we must evaluate them carefully to be sure that in our zeal to make advances, we do not lose some of the values we now possess.

The Author

EARL D. BLACK is Head, Engineering Drawing, Product Engineering Department, of General Motors Institute, Flint 2, Michigan.

THE CASE FOR TECHNICAL ILLUSTRATION

Pictorial representation saves both writer's and reader's time

by J. R. Lindley

THERE WAS a time when medical doctors probably were required to do more reading than any other professional men so they could keep abreast of their ever-changing field. In recent years, however, persons affiliated with the varied and rapidly growing fields of engineering and science have been confronted with a vast amount of technical and scientific literature that must be read if they are to remain familiar with developments that are occurring almost hourly.

With this thought foremost, the role of the draftsman becomes increasingly important in the preparation of illustrations for technical materials. The old cliché, "A good picture is worth a thousand words" is just as true today as it was in the days of the temple-builders. A well-planned drawing will bridge gaps in language, training and understanding, and is applicable wherever it is seen and used.

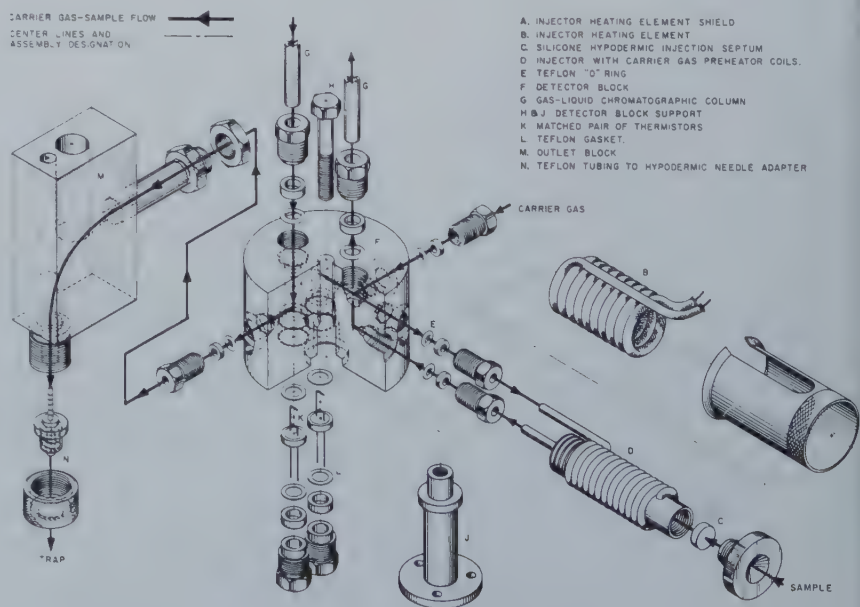
The validity of this statement is becoming more apparent each day as exemplified by the growing use of drawings in technical publications of all types. The trend is definitely away from lengthy and involved written explanations of processes, trends, methods, or of complicated mechanisms. An effectively prepared chart,

graph or three-dimensional drawing will present the same information in a manner that is quickly and easily understood.

These graphic presentations save the time of the author, often a scientist, who would prefer to spend more time on research and less time on writing. For the reader, time saved in reading and grasping the meaning

of an article clarified by good illustrations can be used to read still other items that concern him. For the author, an added bonus is often realized in that a tastefully illustrated article has the advantage of being much more likely to attract the attention and interest of even the more casual readers.

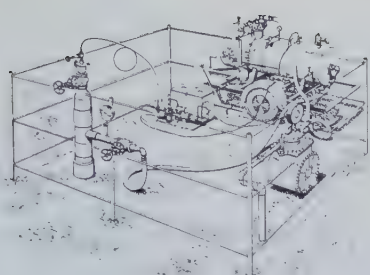
Four examples of illustration are



AN EXPLODED ASSEMBLY. The description of a piece of equipment can be made easily understood by showing, as here, the interrelation of parts to the reader or user.



A CARTOON-TYPE chart can illustrate a trend, *i.e.*, movement of the computed centers of crude-oil production for the United States over several periods of time.



A PICTORIAL DRAWING is used here to illustrate a method. In this case the drawing shows a method for the continuous removal of water from a gas well.

presented and show how each fulfills a different purpose as described by its title. These range from a cartoon approach, showing a statistical trend, to a detailed exploded assembly of a complicated piece of research equipment.

In this article I have endeavored not only to promote an increased interest in technical illustration, but also to point out the importance of teamwork between the author and the draftsman-illustrator. Some writers still fail to recognize the favorable effect that proper illustrations can have on their product. Conversely, some draftsmen do not take the trouble to promote this coalition between themselves and the technical writers in their organizations.

Both should know one another better. You, the author, may be astonished at the help your draftsman-illustrator can give you. You, the draftsman, may find a new interest and challenge in converting pages of words into a single illustration!

The Author

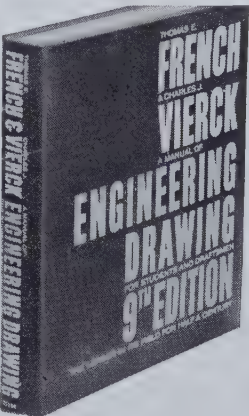
J. R. LINDLEY, Engineering Draftsman (Development Design-Mechanical), has the dual job of designer of laboratory apparatus, and illustrator, at the Bartlesville Petroleum Research Center, P.O. Box 1321, Bartlesville, Oklahoma. The center is under the supervision of the United States Department of the Interior, Bureau of Mines.



A COMPOSITE illustration can be used to draw attention to an article describing similar installations. The perspective drawing simplifies description of flow diagrams.

Win the higher pay of top-flight draftsmen using these proven drawing techniques.

There's bigger money waiting for the man with a more complete knowledge of engineering drawing — and you'll have the extra know-how needed to step up your income with the techniques this book makes plain. This best-selling manual—used by thousands of engineers, designers, and draftsmen as an on-the-job reference—covers every vital step in the field of engineering drawing. Its 22 chapters will bring you clear discussions of such subjects as the calculation of volume, the code for materials in section, the effect of basic manufacturing on drawing, and much more.



Ninth Edition of FRENCH'S A Manual of ENGINEERING DRAWING

By Thomas E. French
formerly, The Ohio State University
and Charles J. Viereck
University of Florida with the assistance of
Ralph S. Paffenbarger
The Ohio State University
9th Edition, 744 pages, 8 1/4 x 9 1/4
1543 illustrations, \$12.00

With this easy-to-study manual you can fully master the "universal graphical language of the industrial world"—you'll know the *right* way to represent a three-dimensional part, tool, or structure on paper—and be able to do it clearly, accurately, do it so your fellow-workers will know its exact size, make-up, and specifications!

It brings you help right when you need it on the job—gives you all the essential facts on tolerances—explains projection—describes such special methods of drawing as oblique views, sectioning, developments, and pictorial sketching—and finally it provides a detailed study of each class of engineering drawing. Over 1500 illustrations help make this book a "must" for your working library!

Check these features of the Ninth Edition . . .

- 6 rules for the precedence of lines
- a 6-point system for orthographic reading
- 13-point checklist for tracing drawings
- 2 methods to prepare forging drawings
- 5 steps in preparing auxiliary views
- the 4 types of assembly drawings
- a checklist for structural steel detailing
- a checklist of minimum tolerances
- 5 rules for the calculation of volume
- ASA thread symbols
- 9 point method for making working drawings

To: GRAPHIC SCIENCE,
Wilton Center, Wilton, Conn.
Please send me copies of *A Manual of Engineering Drawing* at \$12.00 each. A check or money order for dollars is enclosed.
My mailing address is as follows:
(print or type)

New Products



750 Watt Overhead Projector

A new "overhead" projector which is designed to give more light and less heat than 1000 watt projectors of similar design has been announced by the Audio Visual Department, General Aniline and Film Corp., Johnson City, New York. A precise Fresnel lens and a "large" stage complete the working aspect of the unit. Other features include clean lines, sturdy construction, mechanical simplicity, a conveniently located focusing knob, and a detachable headpost for convenient portability.



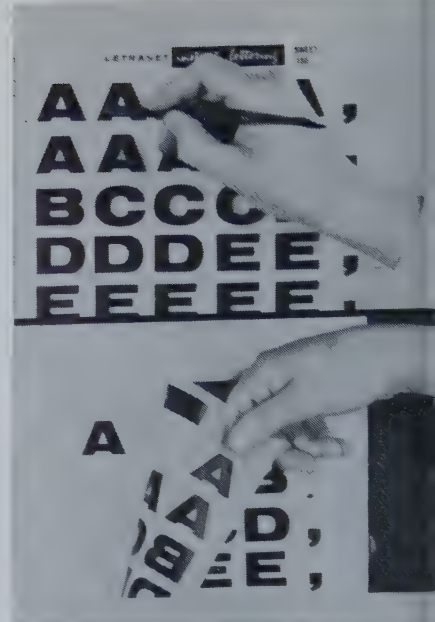
Is Back!

RICHTER precision drawing instruments—for the professional who insists on the very highest standards, and for the apprentice or student who can strive for these same standards if he becomes accustomed to working with fine instruments right from the start. Richter instruments are competitively priced, too. Ask for circular #101.

U. S. BLUE PRINT PAPER CO.
111 N. Wacker Dr.—Chicago 6, Ill.

Inexpensive Whiteprinter

A new whiteprinter with "finger-tip" controls and what is described as the "fastest whiteprinting lamp on the market" is now being distributed by Rotolite Sales Corp., Stirling, N. J. The diazo unit minimizes upkeep and maintenance, with both printer and developing tube small enough to permit desk-top or wall-mounted installation. Five models are available, taking any length paper, in widths of 18, 27 and 42 inches.



Transferring Letters

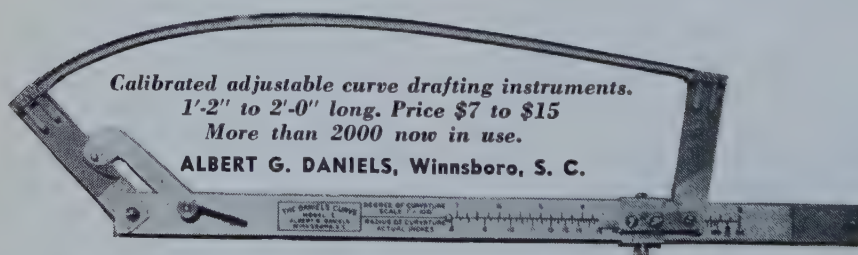
Fonts of individual letters which can be transferred to rough or finished art work, including charts, graphs, displays, slides for projection, signs, and even doors, by merely outlining the backing sheet with a burnisher (or ball point pen), are now being distributed by Arthur Brown & Bro., Inc., 2 West 46th St., New York 36, N. Y., from whom samples and catalog can also be obtained. The product, called "Instant Lettering," is available in black, or white, for reverse effects. Once adhered to the artwork, the letter is permanently affixed, and resists scratching or similar marring. The carrying (backing) sheets are 10- by 15-inches, and a variety of type sizes and styles are available.

Automatic Photocopier

A high-volume photocopying unit capable of producing at up to 6.8 prints per minute, and described as unequalled for production of enlarged or reduced size photocopies from every type or color of subject up to 20- by 28-inches, has been announced by Photostat Corp., Rochester, N. Y. The unit (which weighs 1400 pounds net) can be used for enlarging from microfilm, or reducing records to smaller size. The unit can also be utilized in the reproduction of reduced-size drawings. Among the features of this 10.14 copier are these. (1) Semi-automatic focusing; two adjustments set the unit for reduction or enlargement desired. (2) Speed. (3) A push-button control unit, with facilities for microfilm enlargement controls and automatic repeat copying (up to 80 prints at one setting). (4) Microfilm enlarger which, as optional attachment, permits making of projection copies from microfilm in roll or aperture card form.

Flatbed Offset Presses

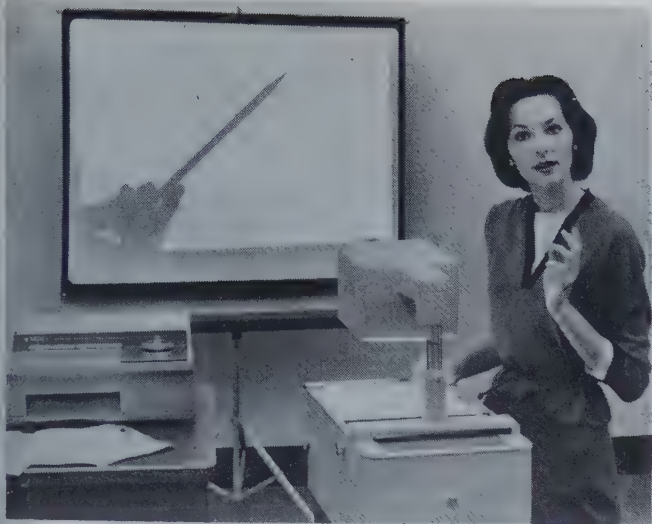
Larger models of the semi-automatic Kalle Flatbed offset press—20-by-28-inch and 22-by-30-inch sizes—are now available, according to Amsterdam Continental Types & Graphic Equipment, Inc., 268 Park Ave So., New York 10, N. Y., distributors of this equipment. Designed and built by the Kalle Works of West Germany, the presses have continuously adjustable speeds from 320 to 850 iph; they are said to be extremely effective for printed electrical circuits, offset proofing, and short-run color work.



Calibrated adjustable curve drafting instruments.
1'-2" to 2'-0" long. Price \$7 to \$15
More than 2000 now in use.

ALBERT G. DANIELS, Winnsboro, S. C.

(For additional information regarding the new products described here, contact the manufacturer directly. Complete addresses are included.)



NEW projection transparencies can be made in seconds in any lighting conditions; shown here in projector.

Heat-Developing "Visual"

New film for overhead projection develops permanently in 4 seconds

SOMETHING of a new dimension has been added to the many recent developments in the graphics field, with the announcement recently by the Thermo-Fax Division of Minnesota Mining and Mfg. Co., of a plastic transparency which will "pickup" copy from almost any document, and be ready for projection in about 10 seconds. The 8½-by-11-inch film is available in positive, negative, or colored form.

Making of the transparency is a simple operation: The film and "original" document are inserted in a "Thermo-Fax" copying machine, and the image is made in about four seconds. Process is completely dry, and requires no chemicals, etc.

In addition to the film, which is new, and the traditional Thermo-Fax machine, the Division has incorporated a new overhead projector into their "visual communications system."

The transparencies (film) sell for approximately 13 to 15 cents each depending on quantities purchased, a price described by company officials as being "more economical than any previous method of making and projecting transparencies."

In addition to its other unique characteristics, the transparent projection film is described as permanent and durable, and can be filed away for future use. New data can be added to old transparencies by running them through the copying machine at any time. Quality of reproduction is said to be good with sharpness and fine detail retained on the projected image. In addition to positive, and reverse black, colors available include red, green, blue, orange, and brown.

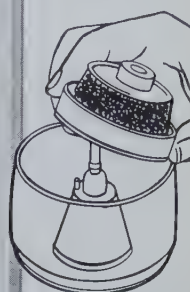
Additional information? Write 3-M, Dept. GSO-409, 900 Bush Ave., St. Paul 6, Minn.

Get the POINT

you will with a
BOSTON LEAD POINTER

The new Boston Lead Pointer is designed with the designer in mind. You make your own desired point by simply adjusting the length of the lead using the lines on the top for measuring the length of lead. The Boston Lead Pointer can be used as a portable or in a fixed position . . . leads won't break.

Taper lengthens with length of lead.



Disposable refills come packaged three to a box.



**CLEAN & QUICK
REFILL CUPS**
Simply throw away the old. Drop in the new. No dirt . . . No mess.

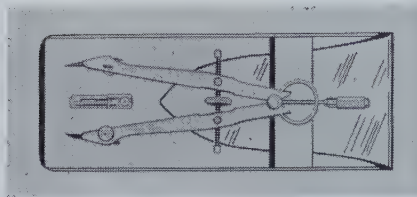
the NEW
BOSTON® **LEAD
POINTER**

C. HOWARD HUNT PEN COMPANY
CAMDEN 1, NEW JERSEY

New Products

Microfilm Aperture Card

A new type of aperture card, developed by Microseal Corp., Chicago, and being marketed by Remington Rand Systems, 122 East 42nd St., New York 17, N. Y., has been announced by the latter. The Microseal "D" card provides protection for the microfilm frame through the use of a transparent acetate pocket; a hand mounter enables pockets to be loaded (mounted) at a rate of from 400 to 600 per hour. According to Remington Rand, features of the "D" card include ease of handling film; sorting in all standard EAM equipment without need of adapters; duplicate diazo Microseal cards can be made quickly and economically; and hard copy prints can be processed from the cards by most standard readers. Accessory equipment includes a Microseal viewer, diazo duplicator, and hand mounter.



6" Bow Compass

An economically - designed bow compass (\$2.50) of aluminum, with steel center assembly and nickel spindle caps and supporting steel parts has been announced by Alvin & Co., 611 Palisade Ave., Windsor, Conn. Wheel adjustment permits rapid change from $\frac{1}{8}$ " to 9" diameters. Plastic tube holds the divider needle and shoulder needle points in addition to compass lead and spare parts. Entire compass is enclosed in a protective vinyl case for easy handling.

Portable Pencil Pointer

A Twirl-A-Point draftsman's pencil pointer, which generates a point of good proportion, and is portable and clean and easy to use, has been recently placed on the market by Jones and Company, P.O. Box 2074, South Bend, Indiana. It sells at about \$1.50. The sharpener, in the approximate shape of a short test-tube, contains an abrasive ring formed from a material consisting of tungsten carbide grits brazed to steel. A vinyl wiping surface within the tube is of the correct geometrical shape to do an effective job of cleaning the sharpened point; a stop-plug serves to position the pencil longitudinally, and also to restrict the passage of graphite back into the operating chamber of the device. Simple twist of the pencil holder within the abrasive ring generates the point.

Laminating Process

New method of laminating papers, letters, charts, photographs, and other written or printed documents with plastic film on Thermo-Fax copying machines has been announced by Minnesota Mining and Mfg. Co., Dept. SO-138, 900 Bush Ave., St. Paul 6, Minn. Originals and sheets inserted in the copying machine emerge seconds later, completely bonded with a tough, transparent seal that resists moisture, liquids, greases and smudges. Average cost of laminating an 8 $\frac{1}{2}$ " by 11" document on both sides ranges from 9 to 12 cents, depending on quantities purchased.

Magnetic T-Square

An accessory for the draftsman who works at home, or in the field, is a new magnetic T-Square which adheres to the metal edge of the drawing board, permitting free use of both hands for work with triangles and instruments. For the drawing board without metal edges, Erase-Horse, Inc., P.O. Box 20104, Houston 25, Texas, also offers a chrome steel strip with adhesive backing. Both T-Squares and strips are available in standard sizes, or in kits, packaged with a custom made board.

NEWS

FROM **ART BROWN**
AMERICA'S LARGEST
ART SUPPLY CENTER

ROTO-TRAY

The revolving receptacle that holds all your working tools within easy reach

No more mess and clutter! The Roto-Tray holds almost every item you need within a 10-inch circle—and revolves to bring just what you want right to your fingertips. Moulded lifetime plastic on steel base.

In 4 Colors: Fire Red, Ivory, Maroon, Antique, Ebony, **\$5.95** ppd.

Write on your letterhead for 200 page catalogue of art supplies — "an Encyclopedia of Artists Materials."

ARTHUR BROWN & BRO., Inc.
2 W. 46th St., New York 36, N. Y.

Solar Products

A New Quality Standard
for
Diazo Papers

ALL TYPES OF REPRODUCTIONS
DRAFTING SUPPLIES

SOLINE
AQUAZO
DRY PHOTO

for Ammonia
for Sepia Moist
for Photographic-like Prints

Write for catalogue.

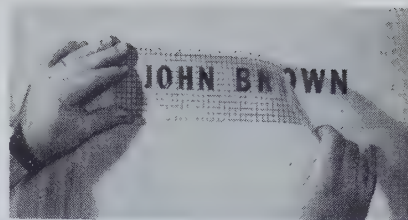
SOLAR PRODUCTS 34 So. 16th St., Phila. 2 Pa.—Ph: LOcust 3-4688

New Products

12-inch Photocopier

A diffusion transfer photocopier, announced by Ampto, Inc., Newton, N. J., is designed to compete, price-wise, with most standard 9-inch office copiers. Among the applications for which the 12-inch unit is suited, according to Ampto, are the following: small engineering drawings, maps, preparation of positives for offset plate making, intermediates for white-print and blueprint equipment, visual communication (overhead) transparencies. Mechanical features of the unit include fully-automated solution control. When machine is turned on, developing solution automatically fills processing tray; turned off, solution flows back into sealed plastic cartridge.

For additional information regarding the new products described here, contact the manufacturer directly. Complete addresses are included.



Reusable Adhesive Letters

Plastic letters and symbols with adhesive backing are now being offered in opaque black, red, white, silver, gold, copper, or transparent colors. They are available from Ozalid Div., General Aniline & Film Corp., Johnson City, N. Y. Among the applications for which the Planotype letters and symbols are suited are (1) preparation of diazo masters for transparencies, posters, charts, and the like, and (2) for use as captions in conjunction with continuous-tone photography. The letters are available in a variety of type styles in 10 sizes from 5/32" to 1 1/2", and are made of thin, pliable plastic with beveled edges. They are self-adhesive, and can be re-used; are supplied on aluminum sheets.

Horizontal Bed Camera

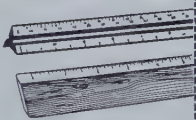
A semi-portable unit which occupies a space only 20-inches wide and 50-inches long on a table or bench has been announced by Lacey-Luci Products, Inc., 31 Central Ave., Newark 2, N. J. Adjustable lights, which are controlled by an automatic reset timer, are attached to the 20- by 20-inch tilting copy board. An 8 1/4-inch Wollensak Process Lens is furnished, which adequately covers 1:1 the 11- by 14-inch film contained in the detachable film holder. An enlargement and reduction ratio of more than two times is possible.

ALVIN
DRAWING & DRAFTING
INSTRUMENTS Help You
Get CLEAN — SHARP
DRAWINGS Quickly
Accurately

Quality Instruments at the Right Price

5" Pocket Slide Rule

Professional accuracy. Permanent graduations machine divided. Pure white divynyl plastic resists acids, oils, etc. Scales K, A, B, C1, C, D, S & T. Smooth riding cursor. Hairline marker. Insures perfect legibility. No. 222P \$4.95



Drawing Scales

Professional grade triangular & opposite bevel boxwood drawing scales. Machine divided graduations, clearly & accurately engraved. Available in Architect's, Engineer's and Mechanical Draftsman's Scales. No. 240 Triangular Scale \$4.75 No. 250 Opposite Bevel Scale \$2.75



Tru-Angle Adjustable Protractor-Triangle
Acrylic Plastic rigid and shatter resistant. Permanently riveted adjustable arm. Beveled protractor edges. One-half degree graduations. Available clear and fluorescent. No. 108C - 8" \$4.50



X-A Ink Remover
Specifically developed for tracing-papers, and cloths, vellums and plastic mediums. Eradicates India Ink, Ballpoint, Rubber stamp, carbon and pencil impressions. Cleans instruments. No. X-A \$1.65 Bottle

For more information on the complete ALVIN line of drawing and drafting equipment see your dealer, or write for FREE 124 pg. catalog.



ALVIN & CO., INC., Windsor, Conn.

- Drafting Materials
- Measuring Devices
- Drawing Equipment
- Designing Aids
- Drawing Sets
- Drafting Instruments

Pick up a DAMASCUS



...and
feel the
difference

You'll discover something new the moment you pick up a DAMASCUS drawing pencil—new comfort, new control. It fits so easily, so naturally in your hand. It means the end of finger fatigue, the beginning of new, positive, non-slip control. You'll enjoy using one. And you'll appreciate the real blackness in every degree that means easy visibility and clear reproduction. You'll also like the smooth, strong lead with the really long-lasting point. Try one yourself and you'll see. In all art and engineering degrees.



Write for descriptive literature and name of your distributor. Dept. GS-2
RICHARD BEST PENCIL COMPANY, INC.
Springfield, N. J.

New Literature

Dry Photos, Ammonia Developed, is the title of a six-page technical monograph recently published by Andrews Paper & Chemical Co., Inc., P. O. Box 528, 676 Northern Boulevard, Great Neck, N. Y. The folder, which includes samples and is illustrated, describes the history of Andrew's work in producing an adequate paper for making matte photo prints, in addition to glossies. Additional information and/or copies of the brochure can be obtained by writing to Mr. Ed Jahoda at the above address.

Photocopying Methods, the first in a series of pamphlets discussing techniques for the photographer or reproduction room manager, is now available from Anken Film Co., Newton, N. J. Series will be published under the general title, "New Concepts in Photocopying," and will be devoted to off-the-beaten-path techniques and special uses for photocopying machines, papers, films, and solutions. Free.

Precision Measurement and Calibration, a 3-volume set of handbooks for workers in the field of standards, is shortly to be published by the U. S. Government Printing Office, Div., Public Documents, Washington 25, D. C. Volume I covers *Electricity and Electronics* (845 pages, \$6.00); Volume 2, *Heat and Mechanics* (965 pages, \$6.75); and Volume 3, *Optics, Metrology, and Radiation* (1,025 pages, \$7.00). Additional information and order blanks are available from the above address.

"Free Technical Films," a catalogue published by Modern Talking Pictures Service, Inc., 3 East 54th St., New York 22, N. Y., has just been made available. More than 130 films dealing with specific technical subjects are offered on free loan in the catalogue, which itself is free. All are 16 mm., from ¼- to ½-hour in length, with most in color.

Whiteprinter Flyer (SP 60-73) describing the Printmaster 900 dry diazo processor is now available from Ozalid Division, General Aniline & Film Corp., Johnson City, N. Y. The unit described gives top useful speeds up to 75 feet/minute, for paperwidths up to 42". Features of the printer include a sleeveless developer system, balanced cooling, high-intensity lamp, and simplified speed control.

Decimal Inch Dimensioning Scales (TR-156), giving standards on scales to implement the decimal dimensioning practices in the automotive industry, may be ordered from the Society of Automotive Engineers, 485 Lexington Ave., New York 17, N. Y. Price is \$.50 for members, and \$1.00 for non-members. These standards are intended to promote uniformity of scales heretofore considered special by drafting equipment manufacturers.



World-famous CASTELL #9030 Lead spans the whole complex of creative genius—because it gives you density saturation for a crisp, bold image ■ Chisel point or needle-point, CASTELL #9030 lays down black, lightproof lines that don't flake, feather or "burn out" ■ Draws perfectly on all surfaces, including Cronar and Mylar base films ■ Strikes a perfect balance between coverage and easy erasability ■ Produces highest number of Diazotypes or blueprints ■ Consistently uniform degrees, 7B to 10H, each as precise as a machine tool. In plastic tube with gold cap ■ When your brain is in high gear, CASTELL #9030 doesn't hesitate.

FITS ALL STANDARD HOLDERS. Pick up a tube from your supplier today.

A.W.FABER-CASTELL Pencil Co., Inc., Newark 3, N. J.

Now celebrating its 200th birthday

New Literature

Microfilm Camera Brochure (No. F443, Rev. 2A) describing a new, all-purpose microfilm camera called Film-a-record, Model 11, may be requested from Remington Rand, Div. of Sperry Rand Corp., 315 Park Avenue South, New York 10, N. Y. This compact, desktop camera offers three reduction ratios. Two-sided simultaneous photography will film both sides of records, side by side.

Speeding the Reproduction Facility for Baldwin-Lima-Hamilton, an illustrated, eight-page, case-history report, is offered without charge by Anken Film Co., and its affiliate, Ampto, Inc., of Newton, N.J. Written by Ken Fisher, Supervisor, Office Services & Engineering Drawing Reproduction, Baldwin-Lima-Hamilton Corp., the report deals with cost and time-savings realized with a new photocopy-type processing machine and diffusion transfer papers and film, that have been added to B-L-H's diazo reproduction facilities.

Unitized Microfilm Filing Systems Brochure, (No. F571), presenting a line of jackets, and aperture cards, plus suggestions for establishing a complete microfilming system, is offered by Remington Rand, Div. of Sperry Rand Corp., 315 Park Avenue South, New York 10, N. Y.

Correction Fluid Brochure, describing Snopake, a smooth, white opaque that will not chip, crack or peel, is available from Litho-Art Products, Inc., Chicago 13, Ill. Among suggested uses for the opaquing fluid are correcting typing for photo-offset reproduction, Xerox, Verifax, etc.

Projector-Printer Bulletin (No. 50971-12/59), describes the new Kecofox electro-static system which will produce prints from 8½ by 11 inches up to 34 by 48 inches in size. The bulletin may be obtained by Writing KECOFAX, Keuffel & Esser Co., Third and Adams Streets, Hoboken, N. J.

ENGINEERING DRAWING SERVICES

Drafting — Reproduction — Microfilming — Technical Illustration — Consulting

JAY BERGEN & ASSOCIATES

Consultants

- COST REDUCTION
- VALUE ANALYSIS
- MANUFACTURING PROCESS ANALYSIS
- ENGINEERING & MANUFACTURING STANDARDS
- MILITARY STANDARDS
- MICROFILMING & DATA RETRIEVAL
- TECHNICAL INFORMATION SERVICES
- DESIGN & DRAFTING
- SIMPLIFIED DRAFTING
- ENGINEERING PROCEDURES

72 PINWOOD ROAD,
STAMFORD, CONN.

Woodward 6-3359

RENDERINGS

ARCHITECTURAL, TECHNICAL or
ALL MEDIA
Call or Write to

SIDNEY SMITH • DESIGN

1147 EAST 54th STREET
BROOKLYN 34, NEW YORK
Tel.: RN 3-3208

ENGINEERING DRAWING SERVICES

*A Special Ad Feature

Independent organizations having services to offer local engineering department supervisors can take advantage of the reduced rates given to regional services using this special section. \$15.00 a column inch.

For more information, write
Advertising Department,

GRAPHIC SCIENCE

Wilton Center, Wilton, Conn.

CLASSIFIED

WANTED

Drafting Inventions

Organization desiring to manufacture and promote the sale of drafting equipment and supplies seeks inventors with saleable ideas in this field. Will buy outright or produce on royalty basis. Send details to Box 101, Graphic Science, Wilton Center, Wilton, Conn.

OPPORTUNITY FOR DRAFTSMEN AND ENGINEERS

Act as agent part time. Attractive commissions. Write Box GS-102, GRAPHIC SCIENCE, Wilton Center, Wilton, Conn. for complete details.

IS YOUR FILE OF GRAPHIC SCIENCE ISSUES COMPLETE?

Order Back Issues Now

Don't miss important technical features which would help you in your work. Order your missing issues now. We have a limited supply of back issues available at \$1.00 each. Send us a note designating the issues you want. Send check or money order with your request and we will pay postage costs.

CLOTH BOUND EDITION OF GRAPHIC SCIENCE

\$25.00 each

Handsome cloth bound editions of Volumes 1 and 2 complete (October 1959 to December 1960) are now available. If you would like to have one of these valuable editions for your permanent library, they are available at \$25.00 each. Send a check or money order with your request and we will pay the postage costs.

GRAPHIC SCIENCE • Wilton Center • Wilton, Connecticut

New Literature

Drafting Machine Bulletin is now available from V & E Mfg. Co., 766 South Fair Oaks Ave., Pasadena, Calif. Bulletin describes their model 3300 with special emphasis on the 20" arm model, which covers a drawing area up to 34" by 44". Specifications for this and two other models are included.

Precision Small Type Drafting Units Brochure (P 010 E 7.59), presenting a number of Kuhlmann portable folding boards equipped with drafting machines, as well as boards (with machines) that are convertible to work desks (suggested for school use) may be requested from Unitech Corp., 50 Colfax Ave., Clifton, N. J., exclusive distributors for Franz Kuhlmann, K. G. in the United States. Price list is available separately.

Microfilm Reader Spec. Sheet (No. F-436 Rev. 2A), pre-punched for notebook insertion, has been prepared by Remington Rand, Div. of Sperry Rand Corp., 315 Park Avenue South, New York 10, New York. It describes the Film-a-record Reader, Model 9 (Cat. No. F72), a lightweight, tabletop unit with 14 by 14-inch screen, that reads 16mm or 35mm film.

Electronic Microfilm Reader Spec. Sheet (No. F433, Rev. 2) giving data on the Film-a-record AO Reader (Cat. No. F077), is offered by Remington Rand, Div. of Sperry Rand Corp., 315 Park Avenue South, New York 10, N. Y. This caster-mounted unit provides electronically controlled, variable-speed viewing of both 16mm and 35mm film.

Graph Sheet Catalog listing the graph sheets (and their special uses) and an introduction to the selection of grid patterns best suited to individual problem requirements is now available from K & E, Third & Adams Streets, Hoboken, N. J. Book has 92 pages with graph sheet reproductions, many of which are in color. Free.

Paper Handling Systems are presented in plastic bound booklet being offered by General Binding Corp., Northbrook, Ill., a firm which specializes in machines that handle paperwork through four stages: duplicating, collating, laminating and assembly. Booklet shows how this equipment can be used in working or handling typewritten materials, reports, technical data, manuals, catalogs, and presentations.

Wax - Coating Machines Brochure (SR 360 10M), showing machine that speed up graphic arts layouts is offered by Potdevin Machine Co., 285 North St., Teterboro, N. J. The brochure gives details on three types of wax-coating machines which automatically apply a pressure-sensitive wax coating to all pieces that go into a paste-up, mechanical, or layout thereby eliminating hand-pasting.



Graphic Science
has moved to
the country!

Our
New
Address is
Wilton Center
Wilton, Conn.
Phone:
POrter 2-5564

(Copies of the literature reviewed can be obtained directly from the manufacturer or publisher. Complete addresses are included.)

Advertising Index

Alvin and Company, Inc.	25
Richard Best Pencil Co., Inc.	25
Art Brown & Bros.	24
Clearprint Paper Co.	30

GRAPHIC SCIENCE Advertising Representatives

NEW YORK—Charles E. Rhine, Wilton Center, Wilton, Conn. (Code 203) POrter 2-5564.
PHILADELPHIA—George Isherwood, 590 Rutherford Drive, Springfield, Del. Co., Pa. KIngswood 3-0760.
LOS ANGELES—Wettstein, Nowell & Johnson, Inc., 672 South Lafayette Park Place. DUnkirk 8-2286.
SAN FRANCISCO 5—Wettstein, Nowell & Johnson, Inc. Jerry Nowell, 417 Market Street. YUkon 2-9537.
PORTLAND—Wettstein, Nowell & Johnson, Inc., 337 Pittock Block, 921 S.W. Washington St. CApital 8-4107.

Albert G. Daniels	25
Eastman Kodak Company	25
Eberhard-Faber Pen & Pencil Co., Inc.	24
A. W. Faber-Castell Pencil Co.	30
C. Howard Hunt Pen Co.	25
Koh-I-Noor, Inc.	25
Ozalid	25
Frederick Post Company	25
Solar Products	25
J. S. Staedtler, Inc.	25
U. S. Blue Print Paper Co.	25
J. H. Weil Co.	25

KOH-I-NOOR

Precision-Matched Instruments

Koh-I-Noor offers draftsmen an important new dimension in a comprehensive line of instruments and accessories meticulously matched to provide new high levels of professional performance, efficiency and convenience.



MODEL NO. 3060: The regular Koh-I-Noor Rapidograph "Technical" Fountain Pen with self-contained automatic filling system, and pocket clip is a standard drafting room tool.

MODEL NO. 3065: A new model with 7 interchangeable drawing point sections, each color-coded to indicate a different line width. Best buy for the professional who requires frequent change of line widths. Each drawing point section complete with airtight refillable ink cartridge. Interchange is accomplished quickly, cleanly. Comes in handy desk top container.



NOW... TWO KOH-I-NOOR RAPIDOGRAPH TECHNICAL FOUNTAIN PENS

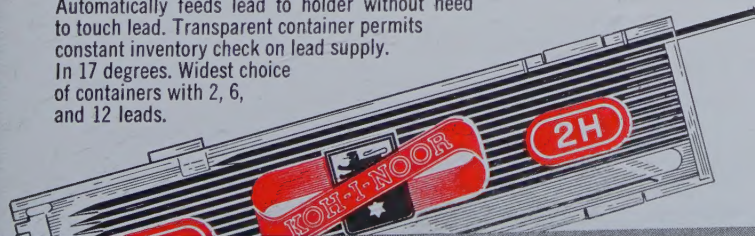
In 7 "color-coded" precision line widths: 00, 0, 1, 2, 2½, 3, 4. Uses India (or regular) ink for ruling, lettering, tracing or writing with equal facility.

(Write for catalog.)

Two Koh-I-Noor products designed to work together... for greater efficiency!

KOH-I-NOOR EJECTOMATIC LEAD DISPENSER

Automatically feeds lead to holder without need to touch lead. Transparent container permits constant inventory check on lead supply. In 17 degrees. Widest choice of containers with 2, 6, and 12 leads.



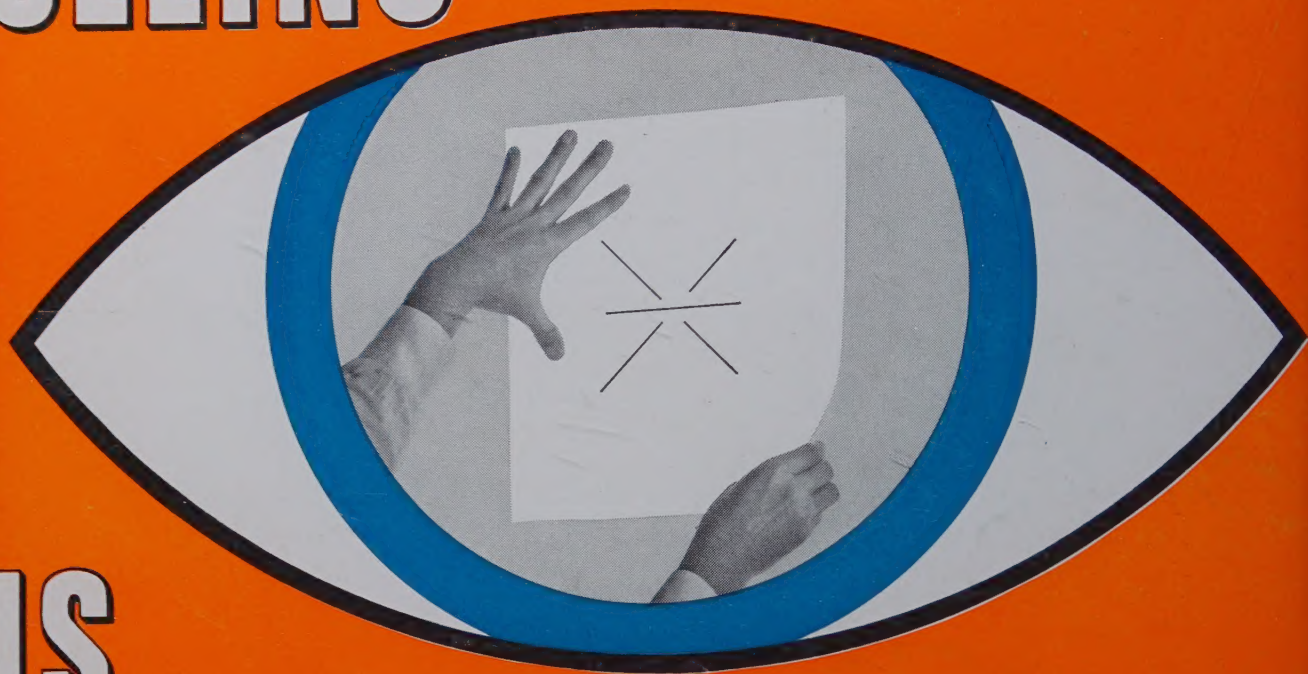
KOH-I-NOOR ADAPTO-CLUTCH LEAD HOLDERS

Widest choice of holders, all metal, perfectly balanced, with non-slip, turn-proof, replaceable clutch; knurled finger grip. With or without pocket clip, lead degree indicator, Color-Coded.

KOH-I-NOOR Inc.

BLOOMSBURY 16, NEW JERSEY

SEEING



IS

BELIEVING!



to prove it's best
make the
Clearprint test

See for yourself why leading engineers and architects demand Clearprint Technical Papers. Ask for a sample, then make this convincing test:

1. INVITES THE PENCIL

Try Clearprint's perfect working surface with a 2H pencil, then with a ruling pen. Lines are sharp and clean—no feathery edges.

2. HIGHEST ERASING QUALITIES

NO GHOSTING — Erase some of the lines. Redraw and erase several of them time and again. Crease the paper, too. Then hold it to the light, or make cleanest possible reproductions.

3. NEVER CHANGES

Sheets in use for 27 years prove Clearprint's amazing stability. Its strength, transparency and printing qualities remain unchanged after extended exposure to age, atmosphere, heat and light. **ITS COLOR DOES NOT CHANGE.**

If you are not using Clearprint now, please make this comparative test on the paper you are using.



"FADE-OUT" PAPER
T.M.
TECHNICAL PAPER

FORMS • CHARTS • GRAPHS

"PRE-PRINT" PAPER
T.M.

THERE IS NO SUBSTITUTE
Clearprint is Watermarked For Your Protection

CLEARPRINT PAPER CO.
1482 - 67th St., Emeryville, Calif.

GS-1560

☐ Send me Clearprint Fade-Out samples, with prices, for the following uses: _____

Name _____

Firm _____

Address _____

City _____ Zone _____ State _____